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GEOGRAPHICAL MEMOIR

UPON

UPPER CALIFORNIA,

IN ILLUSTRATION OF HIS

MAP OF OREGON AND CALIFORNIA,

BY

JOHN CHARLES FRÉMONT:

ADDRESSED TO THE SENATE OF THE UNITED STATES.

WASHINGTON:

WENDELL AND VAN BENTHUYSEN, PRINTERS.

.....

1848.

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REFERENCE

IN SENATE OF THE UNITED STATES.

JUNE 5, 1848.

Resolved, That the Secretary of the Senate be authorized to contract for lithographing and printing twenty thousand copies of J. C. Frémont's Map of Oregon and California, reduced from the original according to the projection to be furnished by the said J. C. Frémont.

Resolved, That there be printed, for the use of the Senate, the same number of copies of J. C. Frémont's Geographical Memoir on Upper California, and in illustration of his Map of Oregon and California; the manuscript and printing of said memoir to be subject to the revision and correction of the author.

Attest :

ASBURY DICKINS,

Secretary of the Senate.

JUNE 15, 1848.

Resolved, That there be printed, for the use of the Topographical Bureau, one hundred copies of Frémont's Map of Oregon and California, and the same number of Frémont's Geographical Memoir (in illustration of his map) of Upper California.

Attest :

ASBURY DICKINS,

Secretary of the Senate.

GEOGRAPHICAL MÉMOIR.

On the second day of February, in the year 1847, during my absence on my third expedition of topographical survey, in the western part of this continent, a resolve was passed by the Senate directing the construction of two maps—one of the central section of the Rocky mountains, and the other of Oregon and Upper California—from the materials collected by me in the two previous expeditions, and with the additions which the then existing expedition might furnish; and Mr. Charles Preuss, my assistant in the first and second expeditions, was employed to commence the work.

On my return to the United States, in the month of September last, I found Mr. Preuss closely engaged upon the work on which the Senate had employed him; and, from that time to the present, I have myself given all the time that could be spared from other engagements to supply the additions which the last expedition has enabled me to make. Conceiving that the map of Oregon and California was of the most immediate and pressing importance, I first directed my attention to its preparation, in order to bring it into a condition as soon as possible to be laid before the Senate; which is now done.

In laying this map of Oregon and Upper California before the Senate, I deem it proper to show the extent and general character of the work, and how far it may be depended on as correct, as being founded on my own or other surveys, and how far it is conjectural, and only presented as the best that is known.

In extent, it embraces the whole western side of this continent between the eastern base of the Rocky mountains and the Pacific ocean, and between the straits of Fuca and the Gulf of California, taking for its outline, on the north, the boundary line with Great Britain, and on the south, including the bay of San Diego, the head of the gulf of California, the rivers Colorado and Gila, and all the country through which the line of the late treaty with Mexico would run, from *El Paso del Norte* to the sea. To complete the view in that quarter, the valley of the Rio del Norte is added, from the head of the river to *El Paso del Norte*, thereby including New Mexico. The map has been constructed expressly to exhibit the two countries of Oregon and the Alta California together. It is believed to be the most correct that has appeared of either of them; and it is certainly the only one that shows the structure and configuration of the interior of Upper California.

The part of the map which exhibits Oregon is chiefly copied

from the works of others; but not entirely, my own explorations in that territory having extended to nearly two thousand miles. The part which exhibits California, and especially the Great Basin, the Sierra Nevada, the beautiful valley of Sacramento and San Joaquin, is chiefly from my own surveys or personal view, and in such cases is given as correct. Where my own observations did not extend, the best authorities have been followed.

The profile view in the margin, on the north side of the map, exhibits the elevations of the country from the *South Pass* in the Rocky mountains to the bay of San Francisco, passing the Utah and the Great Salt lake, following the river Humboldt through the northern side of the Great Basin, crossing the Sierra Nevada into the valley of the Sacramento, where the emigrant road now crosses that sierra forty miles north of Nueva Helvetia. This line shows the present travelling route to California. The profile on the south side of the map exhibits the elevations of the country on a different line—the line of exploration in the last expedition—from the head of the Arkansas by the Utah and Salt lake, and through the interior of the Great Basin, crossing the Sierra Nevada into the Sacramento valley at the head of the *Rio de los Americanos*. These profile views are given merely for their *outlines*, to show the structure of the country between the Rocky mountains and the sea, and the rise and fall occasioned by mountains and valleys. Full and descriptive profile views on a large scale are wanted, marking the geological structure of the country, and exhibiting at their proper altitudes the different products of the vegetable kingdom. Some material is already collected for such a purpose, extending on different lines from the Mississippi to the Pacific, but not sufficient to complete the work.

The Arabic figures on different parts of the map indicate the elevation of places above the level of the sea; a knowledge of which is essential to a just conception of the climate and agricultural capacities of a country.

The longitudes established on the line of exploration of the last expedition are based on a series of astronomical observations, resting on four main positions, determined by lunar culminations. The first of these main positions is at the mouth of the *Fontaine qui Bouit* river, on the Upper Arkansas; the second is on the eastern shore of the Great Salt lake, and two in the valley of the Sacramento, at the western base of the Sierra Nevada. This line of astronomical observations, thus carried across the continent, reaches the Pacific ocean on the northern shore of the bay of Monterey.

In my published map, of the year 1845, the line of the western coast was laid down according to Vancouver. When the newly established positions were placed on the map now laid before the Senate, it was found that they carried the line of the coast about fourteen miles west, and the valleys of the Sacramento and San Joaquin about twenty miles east; making an increase of more than thirty miles in the breadth of the country below the Sierra Nevada. Upon examination, it was found that these positions agreed, nearly, with the observations of Captain

Beechey, at Monterey. The corrections required by the new positions were then accordingly made; the basin of the Sacramento and San Joaquin valleys was removed to the eastward, and the line of the coast projected farther west, conformably to my observations, retaining the configuration given to it by the surveys of Vancouver.

The error in the position of the San Joaquin, Sacramento, and Wahlahmath valleys still exists upon the most authentic maps extant; and it appears that, upon the charts in general use, a greatly erroneous position is still given to the coast.

By the return of the United States sloop-of-war Portsmouth, Commander Montgomery, from the Pacific ocean, it is learned that two British ships of war are now engaged in making a new survey of the gulf and coast of California. It is also known that an American whale ship was recently lost on the coast of California in consequence of the errors in the charts now in general use, locating the coast and islands, from Monterey south, too far east.*

The astronomical observations made by me across the continent, in this my third expedition, were calculated by Professor Hubbard, of the national observatory, (Washington city,) during the present winter; and a note from him on the subject of these observations is added as an appendix to this memoir. My attention having been recently called to this subject, (the true position of the coast of California,) I find it worthy of remark that the position given to this coast on the charts of the old Spanish navigators agrees nearly with that which would be assigned to it by the observations of the most eminent naval surveyors of the present day. The position adopted for Monterey and the adjacent coast, on the map now laid before the Senate, agrees nearly with that in which it had been placed by the observations of *Malaspina*,† in 1791.

In constructing this map it became necessary to adopt the coast line of the Pacific, as found in maps in general use, to give it completeness. It was no part of my design to make a chart of the coast. Finding an error when I came to lay down the Bay of Monterey, I altered my map to suit it. I knew nothing then of any errors in the coast. It is satisfactory now to find that my astronomical observations correspond with those previously made by Beechey and Belcher, and very gratifying to be able to add some testimonial to

*NAVAL.—The United States sloop-of-war Portsmouth, Commander John B. Montgomery, arrived at Boston on Friday, from the Pacific ocean, last from Valparaiso, February 23. Commander Montgomery states that the British frigate "Herald," and the brig "Pandora," are engaged in making a new survey of the gulf and coast of California.

The whale ship "Hope," of Providence, was recently lost on the coast, in consequence of an error in the charts now in general use, which locate the coast and islands from Monterey to Cape St. Lucas from fifteen to forty miles too far to the eastward.—*National Intelligencer*.

†Of this skilful, intrepid, and unfortunate navigator, Humboldt (Essay on New Spain) says:

"The peculiar merit of his expedition consists not only in the number of astronomical observations, but principally in the judicious method which was employed to arrive at certain results. The longitude and latitude of four points on the coast (Cape San Lucas, Monterey, Nootka, and Fort Mulgrave) were fixed in an absolute manner."

the correctness of those made by Malaspina long before either of them. Vancouver removed the coast line as fixed by Malaspina, and the subsequent observations carry it back.

In laying this map before the Senate, and in anticipation of the full work which my explorations (with some further examinations) may enable me to draw up hereafter, I deem it a proper accompaniment to the map to present some brief notices of CALIFORNIA, with a view to show the character of the country, and its capability or otherwise to sustain a considerable population. In doing this, no general remarks applicable to the whole of California can be used. The diversity in different parts is too great to admit of generalization in the description. Separate views of different parts must be taken; and in this brief sketch, the design is to limit the view to the two great divisions of the country which lie on the opposite sides of the SIERRA NEVADA, and to the character of that mountain itself, so prominent in the structure of the country, and exercising so great an influence over the climate, soil, and productions of its two divisions.

SIERRA NEVADA.

This SIERRA is part of the great mountain range, which, under different names and with different elevations, but with much uniformity of direction and general proximity to the coast, extends from the peninsula of California to Russian America, and without a gap in the distance through which the water of the Rocky mountains could reach the Pacific ocean, except at the two places where the Columbia and Frazer's river respectively find their passage. This great range is remarkable for its length, its proximity and parallelism to the sea coast, its great elevation, often more lofty than the Rocky mountains, and its many grand volcanic peaks, reaching high into the region of perpetual snow. Rising singly, like pyramids, from heavily timbered plateaux, to the height of fourteen and seventeen thousand feet above the sea, these snowy peaks constitute the characterizing feature of the range, and distinguish it from the Rocky mountains and all others on our part of the continent.

That part of this range which traverses the ALTA CALIFORNIA is called the *Sierra Nevada*, (Snowy mountain)—a name in itself implying a great elevation, as it is only applied, in Spanish geography, to the mountains whose summits penetrate the region of perpetual snow. It is a grand feature of California, and a dominating one, and must be well understood before the structure of the country and the character of its different divisions can be comprehended. It divides California into two parts, and exercises a decided influence on the climate, soil, and productions of each. Stretching along the coast, and at the general distance of 150 miles from it, this great mountain wall receives the warm winds, charged with vapor, which sweep across the Pacific ocean, precipitates their accumulated moisture in fertilizing rains and snows upon its western flank, and leaves cold and dry winds to pass on to the east. Hence the characteristic differences of the two regions—mildness, fer-

tility, and a superb vegetable kingdom on one side, comparative barrenness and cold on the other.

The two sides of the Sierra exhibit two distinct climates. The state of vegetation, in connexion with some thermometrical observations made during the recent exploring expedition to California, will establish and illustrate this difference. In the beginning of December, 1845, we crossed this Sierra, at latitude $39^{\circ} 17' 12''$, at the present usual emigrant pass, at the head of the Salmon Trout river, 40 miles north of New Helvetia, and made observations at each base, and in the same latitude, to determine the respective temperatures; the two bases being, respectively, the *western* about 500, and the *eastern* about 4,000 feet above the level of the sea; and the Pass, 7,200 feet. The mean results of the observations were, on the *eastern* side, at sunrise, 9° ; at noon, 44° ; at sunset, 30° ; the state of vegetation and the appearance of the country being at the same time (second week of December) that of confirmed winter; the rivers frozen over, snow on the ridges, annual plants dead, grass dry, and deciduous trees stripped of their foliage. At the *western* base, the mean temperature during a corresponding week was, at sunrise 29° , and at sunset 52° ; the state of the atmosphere and of vegetation that of advancing spring; grass fresh and green, four to eight inches high, vernal plants in bloom, the air soft, and all the streams free from ice. Thus December, on one side of the mountain, was winter; on the other it was spring.

THE GREAT BASIN.

EAST of the Sierra Nevada, and between it and the Rocky mountains, is that anomalous feature in our continent, the GREAT BASIN, the existence of which was advanced as a theory after the second expedition, and is now established as a geographical fact. It is a singular feature: a basin of some five hundred miles diameter every way, between four and five thousand feet above the level of the sea, shut in all around by mountains, with its own system of lakes and rivers, and having no connexion whatever with the sea. Partly arid and sparsely inhabited, the general character of the GREAT BASIN is that of desert, but with great exceptions, there being many parts of it very fit for the residence of a civilized people; and of these parts, the Mormons have lately established themselves in one of the largest and best. Mountain is the predominating structure of the interior of the Basin, with plains between—the mountains wooded and watered, the plains arid and sterile. The interior mountains conform to the law which governs the course of the Rocky mountains and of the Sierra Nevada, ranging nearly north and south, and present a very uniform character of abruptness, rising suddenly from a narrow base of ten to twenty miles, and attaining an elevation of two to five thousand feet above the level of the country. They are grassy and wooded, showing snow on their summit peaks during the greater part of the year, and affording small streams of water from five to fifty feet wide, which lose themselves, some in lakes, some in the dry plains,

and some in the belt of alluvial soil at the base; for these mountains have very uniformly this belt of alluvion, the wash and abrasion of their sides, rich in excellent grass, fertile, and light and loose enough to absorb small streams. Between these mountains are the arid plains which receive and deserve the name of desert. Such is the general structure of the interior of the Great Basin, more Asiatic than American in its character, and much resembling the elevated region between the Caspian sea and northern Persia. The rim of this Basin is massive ranges of mountains, of which the Sierra Nevada on the west, and the Wah-satch and Timpanogos chains on the east, are the most conspicuous. On the north, it is separated from the waters of the Columbia by a branch of the Rocky mountains, and from the gulf of California, on the south, by a bed of mountainous ranges, of which the existence has been only recently determined. Snow abounds on them all; on some, in their loftier parts, the whole year, with wood and grass; with copious streams of water, sometimes amounting to considerable rivers, flowing inwards, and forming lakes or sinking in the sands. Belts or benches of good alluvion are usually found at their base.

Lakes in the Great Basin.—The Great Salt lake and the Utah lake are in this Basin, towards its eastern rim, and constitute its most interesting feature—one, a saturated solution of common salt—the other, fresh—the Utah about one hundred feet above the level of the Salt lake, which is itself four thousand two hundred above the level of the sea, and connected by a strait, or river, thirty-five miles long.

These lakes drain an area of ten or twelve thousand square miles, and have, on the east, along the base of the mountain, the usual bench of alluvion, which extends to a distance of three hundred miles, with wood and water, and abundant grass. The Mormons have established themselves on the strait between these two lakes, and will find sufficient arable land for a large settlement—important from its position as intermediate between the Mississippi valley and the Pacific ocean, and on the line of communication to California and Oregon.

The Utah is about thirty-five miles long, and is remarkable for the numerous and bold streams which it receives, coming down from the mountains on the southeast, all fresh water, although a large formation of rock salt, imbedded in red clay, is found within the area on the southeast, which it drains. The lake and its affluents afford large trout and other fish in great numbers, which constitute the food of the Utah Indians during the fishing season. The Great Salt lake has a very irregular outline, greatly extended at time of melting snows. It is about seventy miles in length; both lakes ranging nearly north and south, in conformity to the range of the mountains, and is remarkable for its predominance of salt. The whole lake waters seem thoroughly saturated with it, and every evaporation of the water leaves salt behind. The rocky shores of the islands are whitened by the spray, which leaves salt on everything it touches, and a covering like ice forms over the water, which the waves throw among the rocks. The

shores of the lake in the dry season, when the waters recede, and especially on the south side, are whitened with encrustations of fine white salt; the shallow arms of the lake, at the same time, under a slight covering of briny water, present beds of salt for miles, resembling softened ice, into which the horses' feet sink to the fetlock. Plants and bushes, blown by the wind upon these fields, are entirely encrusted with crystallized salt, more than an inch in thickness. Upon this lake of salt the fresh water received, though great in quantity, has no perceptible effect. No fish, or animal life of any kind, is found in it; the *larvæ* on the shore being found to belong to winged insects. A geological examination of the bed and shores of this lake is of the highest interest.

Five gallons of water taken from this lake in the month of September, and roughly evaporated over a fire, gave fourteen pints of salt, a part of which being subjected to analysis, gave the following proportions:

Chloride of sodium (common salt).....	97.80	parts.
Chloride of calcium	0.61	"
Chloride of magnesium	0.24	"
Sulphate of soda	0.23	"
Sulphate of lime	1.12	"
	<hr/> 100.00	

Southward from the Utah is another lake of which little more is now known than when Humboldt published his general map of Mexico. It is the reservoir of a handsome river, about two hundred miles long, rising in the Wahsatch mountains, and discharging a considerable volume of water. The river and lake were called by the Spaniards, *Severo*, corrupted by the hunters into *Sevier*. On the map, they are called *Nicollet*, in honor of *J. N. Nicollet*, whose premature death interrupted the publication of the learned work on the physical geography of the basin of the Upper Mississippi, which five years of labor in the field had prepared him to give.

On the western side of the basin, and immediately within the first range of the Sierra Nevada, is the Pyramid lake, receiving the water of Salmon Trout river. It is thirty-five miles long, between four and five thousand feet above the sea, surrounded by mountains, is remarkably deep and clear, and abounds with uncommonly large salmon trout. Southward, along the base of the Sierra Nevada, is a range of considerable lakes, formed by many large streams from the Sierra. Lake Walker, the largest among these, affords great numbers of trout, similar to those of the Pyramid lake, and is a place of resort for Indians in the fishing season.

There are probably other collections of water not yet known. The number of small lakes is very great, many of them more or less salty, and all, like the rivers which feed them, changing their appearance and extent under the influence of the season, rising with the melting of the snows, sinking in the dry weather, and distinctly presenting their high and low water mark. These gen-

erally afford some fertile and well-watered land, capable of settlement.

Rivers of the Great Basin.—The most considerable river in the interior of the Great Basin is the one called on the map Humboldt river, as the mountains at its head are called Humboldt river mountains—so called as a small mark of respect to the "*Nestor of scientific travellers*," who has done so much to illustrate North American geography, without leaving his name upon any one of its remarkable features. It is a river long known to hunters, and sometimes sketched on maps under the name of Mary's, or Ogden's, but now for the first time laid down with any precision. It is a very peculiar stream, and has many characteristics of an Asiatic river—the Jordan, for example, though twice as long—rising in mountains and losing itself in a lake of its own, after a long and solitary course. It rises in two streams in mountains west of the Great Salt lake, which unite, after some fifty miles, and bears westwardly along the northern side of the basin towards the Great Sierra Nevada, which it is destined never to reach, much less to pass. The mountains in which it rises are round and handsome in their outline, capped with snow the greater part of the year, well clothed with grass and wood, and abundant in water. The stream is a narrow line, without affluents, losing by absorption and evaporation as it goes, and terminating in a marshy lake, with low shores, fringed with bulrushes, and whitened with saline encrustations. It has a moderate current, is from two to six feet deep in the dry season, and probably not fordable anywhere below the junction of the forks during the time of melting snows, when both lake and river are considerably enlarged. The country through which it passes (except its immediate valley) is a dry sandy plain, without grass, wood, or arable soil; from about 4,700 feet (at the forks) to 4,200 feet (at the lake) above the level of the sea, winding among broken ranges of mountains, and varying from a few miles to twenty in breadth. Its own immediate valley is a rich alluvion, beautifully covered with blue grass, herd grass, clover, and other nutritious grasses; and its course is marked through the plain by a line of willow and cotton wood trees, serving for fuel. The Indians in the fall set fire to the grass and destroy all trees except in low grounds near the water.

This river possesses qualities which, in the progress of events, may give it both value and fame. It lies on the line of travel to California and Oregon, and is the best route now known through the Great Basin, and the one travelled by emigrants. Its direction, nearly east and west, is the right course for that travel. It furnishes a level unobstructed way for nearly three hundred miles, and a continuous supply of the indispensable articles of water, wood, and grass. Its head is towards the Great Salt lake, and consequently towards the Mormon settlement, which must become a point in the line of emigration to California and the lower Columbia. Its termination is within fifty miles of the base of the Sierra Nevada, and opposite the Salmon Trout river pass—a pass only seven thousand two hundred feet above the level of the sea,

and less than half that above the level of the Basin, and leading into the valley of the Sacramento, some forty miles north of Nueva Helvetia. These properties give to this river a prospective value in future communications with the Pacific ocean, and the profile view on the north of the map shows the elevations of the present travelling route, of which it is a part, from the South pass, in the Rocky mountains, to the bay of San Francisco.

The other principal rivers of the Great Basin are found on its circumference, collecting their waters from the Snowy mountains which surround it, and are, 1. BEAR RIVER, on the east, rising in the massive range of the Timpanogos mountains and falling into the Great Salt lake, after a doubling course through a fertile and picturesque valley, two hundred miles long. 2. The UTAH RIVER and TIMPANAOUZU or TIMPANOGOS, discharging themselves into the Utah lake on the east, after gathering their copious streams in the adjoining parts of the *Wah-satch* and Timpanogos mountains. 3. NICOLLET RIVER, rising south in the long range of the *Wah-satch* mountains, and falling into a lake of its own name, after making an arable and grassy valley, two hundred miles in length, through mountainous country. 4. SALMON TROUT river, on the west, running down from the Sierra Nevada and falling into Pyramid lake, after a course of about one hundred miles. From its source, about one-third of its valley is through a pine timbered country, and for the remainder of the way through very rocky, naked ridges. It is remarkable for the abundance and excellence of its salmon trout, and presents some ground for cultivation. 5. CARSON and WALKER rivers, both handsome clear water streams, nearly one hundred miles long, coming, like the preceding, down the eastern flank of the Sierra Nevada and forming lakes of their own name at its base. They contain salmon trout and other fish, and form some large bottoms of good land. 6. OWENS RIVER, issuing from the Sierra Nevada on the south, is a large bold stream about one hundred and twenty miles long, gathering its waters in the Sierra Nevada, flowing to the southward, and forming a lake about fifteen miles long at the base of the mountain. At a medium stage it is generally four or five feet deep, in places fifteen; wooded with willow and cotton wood, and makes continuous bottoms of fertile land, at intervals rendered marshy by springs and small affluents from the mountain. The water of the lake in which it terminates has an unpleasant smell and bad taste, but around its shores are found small streams of pure water with good grass. On the map this has been called OWENS river.

Besides these principal rivers issuing from the mountains on the circumference of the Great Basin, there are many others, all around, all obeying the general law of losing themselves in sands, or lakes, or belts of alluvion, and almost all of them an index to some arable land, with grass and wood.

Interior of the Great Basin.—The interior of the Great Basin, so far as explored, is found to be a succession of sharp mountain ranges and naked plains, such as have been described. These ranges are isolated, presenting summit lines broken into many peaks, of which the

highest are between ten and eleven thousand feet above the sea. They are thinly wooded with some varieties of pine, (*pinus monophyllus* characteristic,) cedar, aspen, and a few other trees; and afford an excellent quality of bunch grass, equal to any found in the Rocky mountains. Black tailed deer and mountain sheep are frequent in these mountains; which, in consideration of their grass, water and wood, and the alluvion at their base, may be called fertile, in the radical sense of the word, as signifying a capacity to produce, or bear, and in contradistinction to sterility. In this sense these interior mountains may be called fertile. Sterility, on the contrary, is the absolute characteristic of the valleys between the mountains—no wood, no water, no grass; the gloomy artemisia the prevailing shrub—no animals, except the hares, which shelter in these shrubs, and fleet and timid antelope, always on the watch for danger, and finding no place too dry and barren which gives it a wide horizon for its view and a clear field for its flight. No birds are seen in the plains, and few on the mountains. But few Indians are found, and those in the lowest state of human existence; living not even in communities; but in the elementary state of families, and sometimes a single individual to himself—except about the lakes stocked with fish, which become the property and resort of a small tribe. The abundance and excellence of the fish, in most of these lakes, is a characteristic; and the fishing season is to the Indians the happy season of the year.

Climate of the Great Basin.—The climate of the Great Basin does not present the rigorous winter due to its elevation and mountainous structure. Observations made during the last expedition, show that around the southern shores of the Salt lake, latitude $40^{\circ} 30'$, to 41° , for two weeks of the month of October, 1845, from the 13th to the 27th, the mean temperature was 40° at sunrise, 70° at noon, and 54° at sunset; ranging at sunrise, from 28° to 57° ; at noon, from 62° to 76° ; at four in the afternoon, from 58° to 69° ; and at sunset, from 47° to 57° .

Until the middle of the month the weather remained fair and very pleasant. On the 15th, it began to rain in occasional showers, which whitened with snow the tops of the mountains on the southeast side of the lake valley. Flowers were in bloom during all the month. About the 18th, on one of the large islands in the south of the lake, *helianthus*, several species of *aster*, *erodium cicutarium*, and several other plants, were in fresh and full bloom; the grass of the second growth was coming up finely, and vegetation, generally, betokened the lengthened summer of the climate.

The 16th, 17th, and 18th, stormy with rain; heavy at night; peaks of the Bear river range and tops of the mountains covered with snow. On the 18th, cleared with weather like that of late spring, and continued mild and clear until the end of the month, when the fine weather was again interrupted by a day or two of rain. No snow within 2,000 feet above the level of the valley.

Across the interior, between latitudes 41° and 38° , during the month of November, (5th to 25th,) the mean temperature was 29° at sunrise, and 40° at sunset; ranging at noon (by detached obser-

rations) between 41° and 60° . There was a snow storm between the 4th and 7th, the snow falling principally at night, and sun occasionally breaking out in the day. The lower hills and valleys were covered a few inches deep with snow, which the sun carried off in a few hours after the storm was over.

The weather then continued uninterruptedly open until the close of the year, without rain or snow; and during the remainder of November, generally clear and beautiful; nights and mornings calm, a light breeze during the day, and strong winds of very rare occurrence. Snow remained only on the peaks of the mountains.

On the western side of the basin, along the base of the *Sierra Nevada*, during two weeks, from the 25th November to the 11th December, the mean temperature at sunrise was 11° , and at sunset 34° ; ranging at sunrise from zero to 21° , and at sunset from 23° to 44° . For ten consecutive days of the same period, the mean temperature at noon was 45° , ranging from 33° to 56° .

The weather remained open, usually very clear, and the rivers were frozen.

The winter of '43-'44, within the basin, was remarkable for the same open, pleasant weather, rarely interrupted by rain or snow. In fact, there is nothing in the climate of this great interior region, elevated as it is, and surrounded and traversed by snowy mountains, to prevent civilized man from making it his home, and finding in its arable parts the means of a comfortable subsistence; and this the Mormons will probably soon prove in the parts about the Great Salt lake. The progress of their settlement is already great. On the first of April of the present year, they had 3,000 acres in wheat, seven saw and grist mills, seven hundred houses in a fortified enclosure of sixty acres, stock, and other accompaniments of a flourishing settlement.

Such is the Great Basin, heretofore characterized as a desert, and in some respects meriting that appellation; but already demanding the qualification of great exceptions, and deserving the full examination of a thorough exploration.

MARITIME REGION WEST OF THE SIERRA NEVADA.

WEST of the SIERRA NEVADA, and between that mountain and the sea, is the second grand division of California, and the only part to which the name applies in the current language of the country. It is the occupied and inhabited part, and so different in character—so divided by the mountain wall of the Sierra from the Great Basin above—as to constitute a region to itself, with a structure and configuration—a soil, climate, and productions—of its own; and as northern Persia may be referred to as some type of the former, so may Italy be referred to as some point of comparison for the latter. North and south, this region embraces about ten degrees of latitude—from 32° , where it touches the peninsula of California, to 42° , where it bounds on Oregon. East and west, from the Sierra Nevada to the sea, it will average, in the middle parts, 150 miles; in the northern parts 200—giving an area of above one hundred

thousand square miles. Looking westward from the summit of the Sierra, the main feature presented is the long, low, broad valley of the Joaquin and Sacramento rivers—the two valleys forming one—five hundred miles long and fifty broad, lying along the base of the Sierra, and bounded to the west by the low coast range of mountains, which separates it from the sea. Long dark lines of timber indicate the streams, and bright spots mark the intervening plains. Lateral ranges, parallel to the Sierra Nevada and the coast, make the structure of the country and break it into a surface of valleys and mountains—the valleys a few hundred, and the mountains two to four thousand feet above the sea. These form greater masses, and become more elevated in the north, where some peaks, as the Shastl, enter the regions of perpetual snow. Stretched along the mild coast of the Pacific, with a general elevation in its plains and valleys of only a few hundred feet above the level of the sea—and backed by the long and lofty wall of the Sierra—mildness and geniality may be assumed as the characteristic of its climate. The inhabitant of corresponding latitudes on the Atlantic side of this continent can with difficulty conceive of the soft air and southern productions under the same latitudes in the maritime region of Upper California. The singular beauty and purity of the sky in the south of this region is characterized by Humboldt as a rare phenomenon, and all travellers realize the truth of his description.

The present condition of the country affords but slight data for forming correct opinions of the agricultural capacity and fertility of the soil. Vancouver found, at the mission of San Buenaventura, in 1792, latitude $34^{\circ} 16'$, apples, pears, plums, figs, oranges, grapes, peaches, and pomegranates growing together with the plantain, banana, cocoa nut, sugar cane, and indigo, all yielding fruit in abundance and of excellent quality. Humboldt mentions the olive oil of California as equal to that of Andalusia, and the wine like that of the Canary islands. At present, but little remains of the high and various cultivation which had been attained at the missions. Under the mild and paternal administration of the "*Fathers*," the docile character of the Indians was made available for labor, and thousands were employed in the fields, the orchards, and the vineyards. At present, but little of this former cultivation is seen. The fertile valleys are overgrown with wild mustard; vineyards and olive orchards, decayed and neglected, are among the remaining vestiges; only in some places do we see the evidences of what the country is capable. At San Buenaventura we found the olive trees, in January, bending under the weight of neglected fruit; and the mission of San Luis Obispo (latitude 35°) is still distinguished for the excellence of its olives, considered finer and larger than those of the Mediterranean.

The productions of the south differ from those of the north and of the middle. Grapes, olives, Indian corn, have been its staples, with many assimilated fruits and grains. Tobacco has been recently introduced; and the uniform summer heat which follows the wet season, and is uninterrupted by rain, would make the

southern country well adapted to cotton. Wheat is the first product of the north, where it always constituted the principal cultivation of the missions. This promises to be the grain growing region of California. The moisture of the coast seems particularly suited to the potato and to the vegetables common to the United States, which grow to an extraordinary size.

Perhaps few parts of the world can produce in such perfection so great a variety of fruits and grains as the large and various region enclosing the bay of San Francisco and drained by its waters. A view of the map will show that region and its great extent, comprehending the entire valleys of the Sacramento and San Joaquin, and the whole western slope of the Sierra Nevada. General phrases fail to give precise ideas, and I have recourse to the notes in my journal to show its climate and productions by the test of the thermometer and the state of the vegetable kingdom.

VALLEYS OF THE SACRAMENTO AND SAN JOAQUIN.

These valleys are one, discriminated only by the names of the rivers which traverse it. It is a single valley—a single geographical formation—near 500 miles long, lying at the western base of the Sierra Nevada, and between it and the coast range of mountains, and stretching across the head of the bay of San Francisco, with which a *delta* of twenty-five miles connects it. The two rivers, San Joaquin and Sacramento, rise at opposite ends of this long valley, receive numerous streams, many of them bold rivers, from the Sierra Nevada, become themselves navigable rivers, flow toward each other, meet half way, and enter the bay of San Francisco together, in the region of tide water, making a continuous water line from one end to the other.

The valley of the San Joaquin is about 300 miles long and 60 broad, between the slopes of the coast mountain and the Sierra Nevada, with a general elevation of only a few hundred feet above the level of the sea. It presents a variety of soil, from dry and unproductive to well watered and luxuriantly fertile. The eastern (which is the fertile) side of the valley is intersected with numerous streams, forming large and very beautiful bottoms of fertile land, wooded principally with white oaks (*quercus longiglанда*, Torr. and Frem.) in open groves of handsome trees, often five or six feet in diameter, and sixty to eighty feet high. Only the larger streams, which are fifty to one hundred and fifty yards wide, and drain the upper parts of the mountains, pass entirely across the valley, forming the *Tularé* lakes and the San Joaquin river, which, in the rainy season, make a continuous stream from the head of the valley to the bay. The *foot hills* of the Sierra Nevada, which limit the valley, make a woodland country, diversified with undulating grounds and pretty valleys, and watered with numerous small streams, which reach only a few miles beyond the hills, the springs which supply them not being copious enough to carry them across the plains. These afford many advantageous spots for farms, making sometimes large bottoms of rich moist land. The rolling sur-

face of the hills presents sunny exposures, sheltered from the winds, and having a highly favorable climate and suitable soil, are considered to be well adapted to the cultivation of the grape, and will probably become the principal vine growing region of California. The uplands bordering the valleys of the large streams are usually wooded with evergreen oaks, and the intervening plains are timbered with groves or belts of evergreen and white oaks among prairie and open land. The surface of the valley consists of level plains along the Tularè lakes and San Joaquin river, changing into undulating and rolling ground nearer the foot hills of the mountains.

A condensed notice from observations, made during several journeys through the valley, will serve to give some definite ideas of its climate and character.

We left the upper settlements of New Helvetia on the 14th December, and, passing through the groves of oak which border the Rio de los Americanos, directed our course in a southeasterly direction across a plain toward the Rio de los Cos-um-nes, a handsome, well wooded stream, about thirty yards wide. The Cos-um-ne Indians, who give name to this river, have been driven away from it within a few years, and dispersed among other tribes; and several farms, of some leagues in extent, have already been established on the lower part of the stream. We encamped at one of these, about eight miles above the junction of the Cos-um-ne river with the Mo-kel-um-ne, which a few miles below enters a deep slough in the tide water of the San Joaquin delta.

At this place the temperature at sunset was 55° , and at sunrise 27° .

Our road on the 15th was over the plain between the Cos-um-ne and Mo-kel-um-ne rivers, inclining toward the mountains. We crossed several wooded sloughs, with ponds of deep water, which, nearer the foot hills, are running streams, with large bottoms of fertile land; the greater part of our way being through open woods of evergreen and other oaks. The rainy season, which commonly begins with November, had not yet commenced, and the Mo-kel-um-ne river was at the low stage usual to the dry season, and easily forded. This stream is about sixty yards wide, and the immediate valley some thirty or forty feet below the upland plain. It has broad alluvial bottoms of very fertile soil—sometimes five hundred yards wide, bounded by a low upland, wooded with evergreen oaks. The weather in the evening was calm, the sky mottled with clouds, and the temperature at sunset 52° .

Leaving the Mo-kel-um-ne, (December 16,) we travelled about twenty miles through open woods of white oak, crossing in the way several stream beds—among them the Calaveras creek. These have abundant water, with good land above; and the Calaveras makes some remarkably handsome bottoms. Issuing from the woods, we rode about sixteen miles over an open prairie, partly covered with bunch grass, the timber reappearing on the rolling hills of the river Stanislaus in the usual belt of evergreen oaks. The river-valley was about forty feet below the upland, and the stream seventy

yards broad, making the usual fertile bottoms, which here were covered with green grass among large oaks. We encamped in one of these bottoms, in a grove of the large white oaks previously mentioned, as *quercus longiglanda* (Torr. and Frém.) This oak is a new species, belonging to the division of white oaks, distinguished by the length of its acorn, which is commonly an inch and a half, and sometimes two inches. This long acorn characterizes the tree, which has accordingly been specified by Dr. Torrey as *quercus longiglanda*—(long-acorn oak. *) The tree attains frequently a diameter of six feet, and a height of eighty feet, with a wide spreading head. The many varieties of deciduous and evergreen oaks, which predominate throughout the valleys and lower hills of the mountains, afford large quantities of acorns, which constitute the principal food of the Indians of that region. Their great abundance, in the midst of fine pasture lands, must make them an important element in the agricultural economy of the country.

The day had been very warm, and at sunset the temperature was 55°, and the weather clear and calm.

At sunrise next morning, the thermometer was at 22°, with a light wind from the Sierra, N. 75° E., and a clear pure sky, in which the blue line of the mountain showed distinctly. The way, for about three miles, was through open woods of evergreen and other oaks, with some shrubbery intermingled. Among this was a *lupinus* of extraordinary size, not yet in bloom. Emerging from the woods, we travelled in a southeasterly direction, over a prairie of rolling land, the ground becoming somewhat more broken as we approached the To-wal-um-ne river, one of the finest tributaries of the San Joaquin. The hills were generally covered with a species of geranium, (*erodium cicutarium*), a valuable plant for stock, considered very nutritious. With this was frequently interspersed good and green bunch grass, and a plant commonly called *bur clover*. This plant, which in some places is very abundant, bears a spirally twisted pod, filled with seeds, which remains on the ground during the dry season, well preserved, and affords good food for cattle until the spring rains bring out new grass. We started a band of wild horses on approaching the river, and the Indians ran off from a village on the bank—the men lurking round to observe us. About their huts were the usual *acorn cribs*, containing each some twenty or thirty bushels. We found here excellent grass, and broad bottoms of alluvial land, open-wooded, with large white oaks of the new species. The thermometer, at sunset, was at 54°.5, with a calm, clear atmosphere. Multitudes of geese and other wild fowl made the night noisy.

In the morning, the sky was clear, with an air from S. 55° E., and a hoar frost covering the ground like a light fall of snow. At sunrise, the thermometer was at 24°.5. Our course now inclined more towards the foot of the mountain, and led over a broken country. In about 17 miles we reached the river Aux-um-né, an-

* The names of plants mentioned in this memoir rest on the authority of Dr. Torrey, by whom the specimens have been examined.

other large affluent, to the San Joaquin, and continued about six miles up the stream, intending to reach, gradually, the heart of the mountains at the head of the *Lake Fork* of the Tulárè.

We encamped on the southern side of the river, where broken hills made a steep bluff, with a narrow bottom. On the northern side was a low, undulating wood and prairie land, over which a band of about three hundred elk was slowly coming to water where we halted, feeding as they approached.

December 19th. The weather continued clear and pleasant. We continued our journey in a southeasterly direction, over a broken and hilly country, without timber, and showing only scattered clumps of trees, from which we occasionally started deer. In a few hours' ride we reached a beautiful country of undulating upland, openly timbered with oaks, principally evergreen, and watered with small streams. We came here among some villages of Indians, of the horse-thief tribes, who received us in an unfriendly manner; and, after a busy night among them, we retreated the next morning to the more open country of the lower hills. Our party was then a small one of 16 men, encumbered with cattle, which we were driving to the relief of the main body of the expedition, which had been sent southward from Walker's lake, in the basin, along the eastern base of the Sierra Nevada, and to which a valley in the mountain, on the Tulárè Lake Fork, had been appointed as a place of meeting.

In the evening, we encamped at an elevation of 1,000 feet above the sea, latitude $37^{\circ} 07' 47''$, still among the hills, on a spring hollow, leading to the Upper Joaquin river. The day had been mild, with a faint sun and cloudy weather; and, at sunset, there were some light clouds in the sky, with a northeasterly wind, and a sunset temperature of 45° ; probably rendered lower than usual by the air from the mountains, as the foot-hills have generally a warmer temperature than the open valley. Elk were numerous during the day, making, on one occasion, a broken band, several miles in length.

On the 21st, the thermometer at sunrise was 32.6 ; the sky slightly clouded, and, in the course of the morning, the clouds gathered heavy in the southwest. Our route lay in a southeasterly direction, toward the Upper Joaquin, crossing, among rolling hills, a large stream and several sandy beds of affluents to the main river. On the trees along these streams, as well as on the hills, I noticed *mosses*. About 2, in the afternoon, we reached the Upper San Joaquin. The stream was here about 70 yards wide, and much too deep to be forded. A little way below, we succeeded in crossing, at a rapid made by a bed of rock, below which, for several miles, the river appeared deep and not fordable. We followed down the stream for six or eight miles, and encamped on its banks, on the verge of the valley plain. At evening, rain began to fall, and, with this, the spring properly commenced. There had been a little rain in November, but not sufficient to revive vegetation.

December 22.—The temperature at sunrise was 39° . There had been heavy rain during the night, with high wind, and this morning, there was a thick fog, which began to go off at 8 o'clock, when the sun broke through. We crossed an open plain, still in a

southeasterly direction, reaching, in about twenty miles, the *Tulares Lake* river. This is one of the largest and handsomest streams in the valley, being about 100 yards broad, and having, perhaps, a larger body of fertile land than any other. The broad alluvial bottoms are well wooded with several species of oaks. This is the principal affluent to the *Tulàrè* lake, (the bullrush lake,) a strip of water, about 70 miles long, surrounded by lowlands, rankly overgrown with bullrushes, and receiving all the rivers in the southern end of the valley. In times of high water, the lake discharges into the Joaquin, making a continuous water line through the whole extent of the valley.

We ascended this river to its sources in the Sierra Nevada, about 50 miles from the edge of the valley, which we reached again on the 7th of *January*, in the neighborhood of the *Tulàrè* lake. We found the temperature much the same as in *December*. Fogs, which rose from the lake in the morning, were dense, cold, and penetrating, but, after a few hours, gave place to a fine day. The face of the country had been much improved by the rains which had fallen while we remained in the mountains. Several humble plants, among them the golden flowered violet (*viola corymbosa*) and *erodium cicutarium*, the first valley flowers of the spring, which courted a sunny exposure and warm sandy soil, were already in bloom on the southwestern hill slopes. In the foot hills of the mountains the bloom of the flowers was earlier. We travelled among multitudinous herds of elk, antelope, and wild horses. Several of the latter, which we killed for food, were found to be very fat. By the middle of *January*, when we had reached the lower San Joaquin, the new green grass covered the ground among the open timber on the rich river bottoms, and the spring vegetation had taken a vigorous start.

The mean temperature in the Joaquin valley, during the journey, from the middle of *December* to the middle of *January*, was at sunrise 29° and at sunset 52° , with generally a faint breeze from the snowy mountains in the morning, and calm weather at the evening. This was a lower temperature than we had found in the oak region of the mountains bordering the valley, between 1,000 and 5,000 feet above the level of the sea, where, throughout California, I have remarked the spring to be more forward than in the open valleys below.

During a journey through the valley, between the head of the *Tulàrè* lakes and the mouth of the San Joaquin, from the 19th *January* to the 12th *February*, the mean temperature was 38° at sunrise, and 53° at sunset, with frequent rains. At the end of *January*, the river bottoms, in many places, were thickly covered with luxuriant grass, more than half a foot high. The California poppy, (*Eschscholtzia Californica*), the characteristic plant of the California spring; *nemophila insignis*, one of the earliest flowers, growing in beautiful fields of a delicate blue, and *erodium cicutarium*, were beginning to show a scattered bloom. Wild horses were fat, and a grisly bear, killed on the 2d *February*, had four inches thickness of fat on his back and belly, and was estimated to weigh a thousand pounds.

Salmon was first obtained on the 4th February in the To-wal-um-né river, which, according to the Indians, is the most southerly stream in the valley in which this fish is found. By the middle of March, the whole valley of the San Joaquin was in the full glory of spring; the evergreen oaks were in flower, *geranium cicutarium* was generally in bloom, occupying the place of the grass, and making on all the uplands a close sward. The higher prairies between the rivers presented unbroken fields of yellow and orange colored flowers, varieties of *Layia* and *Eschscholtzia Californica*, and large bouquets of the blue flowering *nemophila* nearer the streams. These made the prevailing bloom, and the sunny hill slopes to the river bottoms showed a varied growth of luxuriant flowers. The white oaks were not yet in bloom.

Observations made in the valley, from the bend of the Joaquin to the Cós-um-nè river, give, for the mean temperature, from the 10th to the 22d March, 38° at sunrise, and 56° at sunset, the dew point being $35^{\circ}.7$ at sunrise, and $47^{\circ}.6$ at sunset, and the quantity of moisture contained in a cubic foot of air being 2.712 grains, and 4.072 grains, respectively.

A sudden change in the temperature was remarked in passing from the To-wal-um-ne to the Stanislaus river, there being no change in the weather, and the wind continuing from the northwest, to which we were more directly exposed on reaching the Stanislaus river, where we opened on the bay. In travelling down to the Stanislaus the mean temperature for five days (from the 11th to the 16th) was $40^{\circ}.3$ at sunrise, 73° at 4 p. m., and 63° at sunset; and detached observations gave 66° at 9, a. m., 77° at noon, and 87° at 2, p. m.

The dew point was $38^{\circ}.0$, $55^{\circ}.5$, $54^{\circ}.3$ at sunrise, at 4 in the afternoon, and at sunset; and the moisture contained in a cubic foot of air 2.878 grains, 5.209 grains, and 4.927 grains, respectively.

North of the Stanislaus for five days (from 16th to the 21st) the mean was $36^{\circ}.6$ at sunrise, 57° at 4, p. m., and 49° at sunset. The dew point was $34^{\circ}.9$ at sunrise, $37^{\circ}.1$ at 4, p. m., and $40^{\circ}.9$ at sunset, and the quantity of moisture in a cubic foot of air 2.671 grains, 2.983 grains, and 3.216 grains at the corresponding times. At sunrise of the 16th, on the To-wal-um-ne, the thermometer was at 43° , and at sunrise of the next morning, on the Stanislaus, at 35° .

The temperature was lowest on the night of the 17th. At sunrise of the morning following the thermometer was at 27° , and it was remarked that the frost affected several varieties of plants. On the 20th and 21st there were some showers of rain, the first since the end of February. These were preceded by southwesterly winds.

During December and the first part of January, which was still at the season of low waters, we were easily able to ford all the Joaquin tributaries. These begin to rise with the rains, and are kept up by the melting snows in the summer. At the end of January, the Joaquin required boating throughout the valley, and the tributaries were forded with difficulty.

In the latter part of March, of a dry season, (1844,) we were obliged to boat the Stanislaus, To-wal-um-ne, and Aux-um-ne, and the San Joaquin was no where fordable below the bend where it is joined by the slough of the Tularé lake. On the 13th of March, 1846, we were obliged to boat the San Joaquin, the river being no where fordable below the junction of the slough, and the Indians guided us to some difficult fords of the large tributaries, where we succeeded to cross with damage to our equipage. In July of the same year, we boated the San Joaquin below the Aux-um-ne, it being no where fordable below the bend.

In June, 1847, the Joaquin was no where fordable, being several hundred yards broad as high up as the *Aux-um-ne* river, even with its banks, and scattered in sloughs over all its lower bottoms. All the large tributaries, the *Aux-um-ne*, *To-wal-um-ne*, *Stanislaus*, and *Mo-kel-um-ne*, required to be boated, and were pouring down a deep volume of water from the mountains, one to two hundred yards wide. The high waters came from the melting snows, which, during the past winter, had accumulated to a great depth in the mountains, and, at the end of June, lay in the approaches to the Bear river pass, on a breadth of ten or fifteen miles, and this below the level of 7,200 feet. In rainy seasons, when the rains begin with November, and the snows lie on the mountains till July, this river is navigable for 8 months of the year—the length of time depending on the season.

The *Cos-um-ne* was the last tributary of the San Joaquin, and the last river of its valley coming down from the Sierra Nevada. The *Rio de los Americanos* was the first tributary of the valley of the Sacramento, also coming down, like all the respectable tributaries of both rivers from the snowy summit and rainy sides of the great Sierra. The two valleys are *one*, only discriminated in description or reference by the name of the river which traverses the respective halves, as seen in the map. We entered the part of the valley which takes the name of its river, *Sacramento*, on the 21st day of March, going north, and continued our observations on that valley.

We remained several days on the *Rio de los Americanos*, to recruit our animals on the abundant range between the Sacramento and the hills. During this time the thermometer was at 35° at sunrise, 54° at 9 o'clock in the morning, 63° at noon, 63° at 2 in the afternoon, 61° at 4, and 53° at sunset; the dew point at corresponding times being 34°.0, 49°.9, 46°.6, 49°.4, 51°.6, 43°.7; and the quantity of moisture in a cubic foot of air being 2.519 grs., 4.235 grs., 3.808 grs., 4.161 grs., 4.484 grs., 3.469 grs.

We left the *Rio de los Americanos* on the 24th, ten miles above the mouth, travelling a little east of north, in the direction of the Bear river settlements, at the foot of the Emigrant Pass. The road led among oak timber, over ground slightly undulating, covered with grass intermingled with flowers. The thermometer at 4 was 76°, and at sunset 60°; the weather clear.

At sunrise of the 25th, the temperature was 36°, with an easterly wind and clear sky. In about thirty miles travel to the north, we

reached the rancho of Mr. Keyser, on Bear river; an affluent to *Feather* river, the largest tributary of the Sacramento. The route lay over an undulating country—more so as our course brought us nearer the mountains—wooded with oaks and shrubbery in blossom, with small prairies intervening. Many plants were in flower, and among them the California poppy, unusually magnificent. It is the characteristic bloom of *California* at this season, and the Bear river bottoms, near the hills, were covered with it. We crossed several small streams, and found the ground miry from the recent rains. The temperature at 4 in the afternoon was 70°, and at sunset 58°, with an easterly wind, and the night bright and clear.

The morning of the 25th was clear, and warmer than usual; the wind southeasterly, and the temperature 40°. We travelled across the valley plain, and in about 16 miles reached Feather river at 26 miles from its junction with the Sacramento, near the mouth of the *Yuva*, so called from a village of Indians who live on it. The river has high banks—20 or 30 feet—and was here 150 yards wide, a deep, navigable stream. The Indians aided us across the river with canoes and small rafts. Extending along the bank in front of the village, was a range of wicker cribs, about twelve feet high, partly filled with what is there the Indians' staff of life—acorns. A collection of huts, shaped like bee hives, with naked Indians sunning themselves on the tops, and these acorn cribs, are the prominent objects in an Indian village.

There is a fine farm, or *rancho*, on the *Yuva*, stocked with about 3,000 head of cattle, and cultivated principally in wheat, with some other grains and vegetables, which are carried, by means of the river, to a market at San Francisco. Mr. Cordua, a native of Germany, who is proprietor of the place, informed me that his average harvest of wheat was about twenty-five bushels to the acre, which he supposed would be about the product of the wheat lands in the Sacramento valley. The labor on this and other farms in the valley is performed by Indians.

The temperature here was 74°. at 2 in the afternoon, 71°. at 4, and 69°. at sunset, with a northeasterly wind and clear sky.

At sunrise of the 27th the temperature was 42°, clear, with a northeasterly wind. We travelled northwardly, up the right bank of the river, which was wooded with large white and evergreen oaks, interspersed with thickets of shrubbery in full bloom. We made a pleasant journey of twenty-seven miles, and encamped at the bend of the river, where it turns from the course across the valley to run southerly to its junction with the Sacramento. The thermometer at sunset was at 67°, sky partially clouded, with southerly wind.

The thermometer at sunrise on the 28th was at 46°.5., with a northeasterly wind. The road was over an open plain, with a few small sloughs or creeks that do not reach the river. After travelling about fifteen miles we encamped on *Butte* creek, a beautiful stream of clear water about fifty yards wide, with a bold current running all the year. It has large fertile bottoms, wooded with

open groves, and having a luxuriant growth of pea vine among the grass. The oaks here were getting into general bloom. Fine ranchos have been selected on both sides the stream, and stocked with cattle, some of which were now very fat. A rancho here is owned by Neal, who formerly belonged to my exploring party. There is a *rancheria* (Indian village) near by, and some of the Indians gladly ran races for the head and offals of a fat cow which had been presented to us. They were *entirely* naked. The thermometer at 2 in the afternoon was at 70°, two hours later at 74°, and 65° at sunset; the wind east, and sky clear only in the west.

The temperature at sunrise the next day was 50°, with cumuli in the south and west, which left a clear sky at 9, with a northwest wind, and temperature of 64°. We travelled 20 miles, and encamped on Pine creek, another fine stream, with bottoms of fertile land, wooded with groves of large and handsome oaks, some attaining to six feet in diameter, and forty to seventy feet in height. At 4 in the afternoon the thermometer showed 74° and 64° at sunset; and the sky clear, except in the horizon.

March 30.—The sun rose in masses of clouds over the eastern mountains. A pleasant morning, with a sunrise temperature of 46°.5, and some *mosquitoes*—never seen, as is said, in the coast country; but at seasons of high water abundant and venomous in the bottoms of the Joaquin and Sacramento. On the tributaries nearer the mountain but few are seen, and those go with the sun. Continuing up the valley, we crossed in a short distance a large wooded creek, having now about thirty-five feet breadth of water. Our road was over an upland prairie of the Sacramento, having a yellowish, gravelly soil, generally two or three miles from the river, and twelve or fifteen from the foot of the eastern mountains. On the west it was 25 or 30 miles to the foot of the mountains, which here make a bed of high and broken ranges. In the afternoon, about half a mile above its mouth, we encamped on Deer creek, another of these beautiful tributaries to the Sacramento. It has the usual broad and fertile bottom lands common to these streams, wooded with groves of oak and a large sycamore, (*platanus occidentalis*;) distinguished by bearing its balls in strings of three to five; and peculiar to California. Mr. Lassen, a native of Germany, has established a rancho here, which he has stocked, and is gradually bringing into cultivation. Wheat, as generally throughout the north country, gives large returns; cotton, planted in the way of experiment, was not injured by frost, and succeeded well; and he has lately planted a vineyard, for which the Sacramento valley is considered to be singularly well adapted. The seasons are not yet sufficiently understood, and too little has been done in agriculture, to afford certain knowledge of the capacities of the country. This farm is in the 40th degree of latitude; our position on the river being in 30°. 57'. 00'', and longitude 121°. 56'. 44'' west from Greenwich, and elevation above the sea 560 feet. About three miles above the mouth of this stream are the first rapids—the present head of navigation—in the Sacramento river, which, from the rapids to its mouth in the bay, is more than 200 miles long, and in-

creasing in breadth from 150 yards to 600 yards in the lower part of its course.

During six days that we remained here, from the 30th March to the 5th April, the mean temperature was 40° at sunrise, $52^{\circ}.5$ at 9 in the morning, $57^{\circ}.2$ at noon, $59^{\circ}.4$ at 2 in the afternoon, $58^{\circ}.8$ at 4, and 52° at sunset; at the corresponding times the dew point was at $37^{\circ}.0$, $41^{\circ}.0$, $38^{\circ}.1$, $39^{\circ}.6$, $44^{\circ}.9$, $40^{\circ}.5$; and the moisture in a cubic foot of air 2.838 grs., 3.179 grs., 2.935 grs., 3.034 grs., 3.766 grs., 3.150 grs., respectively. Much cloudy weather and some showers of rain, during this interval, considerably reduced the temperature, which rose with fine weather on the 5th. Salmon was now abundant in the Sacramento. Those which we obtained were generally between three and four feet in length, and appeared to be of two distinct kinds. It is said that as many as four different kinds ascend the river at different periods. The great abundance in which this fish is found gives it an important place among the resources of the country. The salmon crowd in immense numbers up the Umpqua, Tlamath, and Trinity rivers, and into every little river and creek on the coast north of the Bay San Francisco, ascending the river Tlamath to the lake near its source, which is upwards of 4,000 feet above the sea, and distant from it only about 200 miles.

In the evening of the 5th we resumed our journey northward, and encamped on a little creek, near the Sacramento, where an emigrant from "the States" was establishing himself, and had already built a house. It is a handsome place, wooded with groves of oak, and along the creek are sycamore, ash, cottonwood, and willow. The day was fine, with a northwest wind.

The temperature at sunrise the next day, (April 6th,) was 42° , with a northeasterly wind. We continued up the Sacramento, which we crossed in canoes at a farm on the right bank of the river. The Sacramento was here about 140 yards wide, and with the actual stage of water, which I was informed continued several months, navigable for a steamboat. We encamped a few miles above, on a creek wooded principally with large oaks. Grass was good and abundant, with wild oats and pea vine in the bottoms. The day was fine, with a cool northwesterly breeze, which had in it the air of the high mountains. The wild oats here were not yet headed.

The snowy *Peak of Shastl* bore directly north, showing out high above the other mountains. Temperature at sunset 57° , with a west wind and sky partly clouded.

April 7.—The temperature at sunrise was 37° , with a moist air; and a faintly clouded sky indicated that the wind was southerly along the coast. We travelled toward the Shastl peak, the mountain ranges, on both sides of the valleys, being high and rugged, and snow-covered. Some remarkable peaks in the Sierra, to the eastward, are called *the Sisters*, and, nearly opposite, the Coast Range shows a prominent peak, which we have called Mount Linn.

Leaving the Sacramento, at a stream called *Red Bank creek*, and continuing to the head of one of its forks, we entered on a high

and somewhat broken upland, timbered with at least four varieties of oaks, with *mansanita* (*arbutus Menziesii*) and other shrubbery interspersed. A remarkable species of pine, having leaves in threes, (sometimes six to nine inches long,) with bluish foliage, and a spreading, oak-shaped top, was scattered through the timber. I have remarked that this tree grows lower down the mountains than the other pines, being found familiarly associated with the oaks, the first met after leaving the open valleys, and seeming to like a warm climate. Flowers were as usual abundant. The splendid California poppy characterized all the route along the valley. A species of clover was in bloom, and the berries of the *mansanita* were beginning to redden on some trees, while on others they were still in bloom. We encamped, at an elevation of about 1,000 feet above the sea, on a large stream called Cottonwood creek, wooded on the bottoms with oaks, and with cottonwoods along the bed, which is sandy and gravelly. The water was at this time about twenty yards wide, but is frequently fifty. The face of the country traversed during the day was gravelly, and the bottoms of the creek where we encamped have a sandy soil.

There are six or seven *rancherias* of Indians on the Sacramento river between the farm where we had crossed the Sacramento and the mouth of this creek, and many others in the mountains about the heads of these streams.

The next morning was cloudy, threatening rain, but the sky grew brighter as the sun rose, and a southerly wind changed to north-west, which brought, as it never fails to bring, clear weather.

We continued 16 miles up the valley, and encamped on the Sacramento river. In the afternoon (April 8) the weather again grew thick, and in the evening rain began to fall in the valley and snow on the mountains. We were now near the head of the lower valley, and the face of the country and the weather began sensibly to show the influence of the rugged mountains which surround and terminate it.

The valley of the Sacramento is divided into upper and lower—the lower two hundred miles long, the upper about one hundred; and the latter not merely entitled to the distinction of upper, as being higher up on the river, but also as having a superior elevation of some thousands of feet above it. The division is strongly and geographically marked. The Shastl peak stands at the head of the lower valley, in the forks of the river, rising from a base of about 1,000 feet, out of a forest of heavy timber. It ascends like an immense column upwards of 14,000 feet, (nearly the height of Mont Blanc,) the summit glistening with snow, and visible, from favorable points of view, at a distance of 140 miles down the valley. The river here, in descending from the upper valley, plunges down through a *cañon*, falling 2,000 feet in twenty miles. This upper valley is 100 miles long, heavily timbered, the climate and products modified by its altitude, its more northern position, and the proximity and elevation of the neighboring mountains covered with snow. It contains valleys of arable land, and is deemed capable of

settlement. Added to the lower valley, it makes the whole valley of the Sacramento 300 miles long.

April 9:—At 10 o'clock the rain which commenced the previous evening had ceased, and the clouds clearing away, we boated the river, and continued our journey eastward toward the foot of the Sierra. The Sacramento bottoms here are broad and prettily wooded, with soil of a sandy character. Our way led through very handsome, open woods, principally of oaks, mingled with a considerable quantity of the oak-shaped pine. Interspersed among these were bouquets or thickets of *mansanita*, and an abundant white-flowering shrub, now entirely covered with small blossoms. The head of the valley here (lower valley) is watered by many small streams, having fertile bottom lands, with a good range of grass and acorns. In about six miles we crossed a creek 20 or 25 feet wide, and several miles farther descended into the broad bottoms of a swift stream about 20 yards wide, called Cow creek, so named as being the range of a small band of cattle, which ran off here from a party on their way to Oregon. They are entirely wild, and are hunted like other game. A large band of antelope was seen in the timber, and five or six deer came darting through the woods. An antelope and several deer were killed. There appear to be two species of these deer—both of the kind generally called black-tailed; one, a larger species frequenting the prairies and lower grounds; the other, much smaller, and found in the mountains only. The mountains in the northeast were black with clouds when we reached the creek, and very soon a fierce hail storm burst down on us, scattering our animals and covering the ground an inch in depth with hailstones about the size of wild cherries. The face of the country appeared as whitened by a fall of snow, and the weather became unpleasantly cold. The evening closed in with rain, and thunder rolling around the hills. Our elevation here was between 1,000 and 1,100 feet. At sunrise the next morning the thermometer was at 33°. The surrounding mountains showed a continuous line of snow, and the high peaks looked wintry. Turning to the southward, we retraced our steps down the valley, and reached Mr. Lassen's, on Deer river, on the evening of the 11th. The Sacramento bottoms between Antelope and Deer river were covered with oats, which had attained their full height, growing as in sown fields. The country here exhibited the maturity of spring. The California poppy was every where forming seed pods, and many plants were in flower and seed together. Some varieties of clover were just beginning to bloom. By the middle of the month the seed vessels of the California poppy, which, from its characteristic abundance, is a prominent feature in the vegetation, had attained their full size; but the seeds of this and many other plants, although fully formed, were still green colored, and not entirely ripe. At this time I obtained from the San Joaquin valley seeds of the poppy, and other plants black and fully ripe, while they still remained green in this part of the Sacramento—the effect of a warmer climate in the valley of the San Joaquin. The mean temperature for 14 days, from the 10th to the 24th of April, was 43° at sunrise, 58° at 9 in the morning,

at noon, 66° at 2 in the afternoon, 69° at 4, and 58° at sunset, (latitude 40° .) The thermometer ranged at sunrise from 38° to 51° , at 4 (which is the hottest of those hours of the day when the temperature was noted) from 53° to 88° , and at sunset from 49° to 65° . The dew point was 40.3 at sunrise, 47.3 at 9 in the morning, 46.1 at noon, 49.2 at 2 in the afternoon, 49.2 at 4, and 46.6 at sunset; and the quantity of moisture in a cubic foot of air at corresponding times was 3.grs.104, 3.grs.882, 3.grs.807, 4.grs.213, 4 grs.217, 3.grs.884, respectively. The winds fluctuated between northwest and southeast, the temperature depending more upon the state of the sky than the direction of winds—a clouded sky always lowering the thermometer fifteen or twenty degrees in a short time. For the greater number of the days above given the sky was covered and the atmosphere frequently thick, with rain at intervals from the 19th to the 23d.

On the 25th May we returned to this place (Lassen's) from an excursion to the Upper Sacramento. The plants we had left in bloom were now generally in seed; and many, including the characteristic plants, perfectly ripe. The mean temperature of a few days ending May was $54^{\circ}.7$ at sunrise, $70^{\circ}.6$ at noon, and $67^{\circ}.3$ at sunset. Travelling south into the more open and wider part of the valley, where the bordering mountains are lower and showed less snow, the temperature increased rapidly. At the *Buttes*—an isolated mountain ridge about six miles long and about 2,690 feet above the sea—the mornings were pleasantly cool for a few hours, but before ten the heat of the sun became very great, though usually tempered by a refreshing breeze. The heat was usually greatest about four in the afternoon. The mean temperature from May 27th to June 6th, was 64° . at sunrise, 79° . at nine in the morning, 86° . at noon, 90° . at two in the afternoon, 91° . at four, and 80° . at sunset, ranging from 53° . to 79° . at sunrise—from 85° . to 98° . at four in the afternoon—and from 73° . to 89° . at sunset. The place of observation was at the eastern base of the *Buttes*, about 800 feet above the sea, latitude $39^{\circ} 12'$, and one of the warmest situations in the Sacramento valley. At corresponding times the dew point was at 56.5 , 62.4 , 66.5 , 68.2 , 66.6 , 66.9 , and the quantity of moisture in a cubic foot of air 5.grs.253, 6.grs.318, 7.grs.191, 7.grs.495, 7.grs.164, and 7.grs.269, respectively. We felt the heat here more sensibly than at any other place where our journeying brought us in California. The hunters always left the camp before daylight, and were in by nine o'clock, after which the sun grew hot. Game was very fat and abundant; upwards of eighty deer, elk, and bear were killed in one morning. The range consisted of excellent grasses, wild oats in fields, red and other varieties of clover, some of which were now in mature seed and others beginning to flower. Oats were now drying in level places where exposed to the full influence of the sun, remaining green in moister places and on the hill slopes.

The mean temperature of the open valley between the *Buttes* and the American fork from the 8th to the 21st June, was 57° . at sunrise, 74° at nine in the morning, 85° at noon, 87° at two in

the afternoon, 88° . at four, and 77° . at sunset; ranging at sunrise from 51° . to 61° .; at 4 from 81° . to 97° . and at sunset from 71° . to 85° . The dew point at corresponding times was $52^{\circ}.8$, $58^{\circ}.8$, $62^{\circ}.1$, $66^{\circ}.8$, $62^{\circ}.5$, $60^{\circ}.7$, and the quantity of moisture in a cubic foot of air being 4.685 grs., 5.709 grs., 6.320 grs., 7.217 grs., 6.377 grs., 5.973 grs., respectively.

Western slope of the Sierra Nevada.—The western flank of this Sierra belongs to the maritime region of California, and is capable of adding greatly to its value. It is a long, wide slope, timbered and grassy, with intervals of arable land, copiously watered with numerous and bold streams, and without the cold which its name and altitude might imply. In length it is the whole extent of the long valley at its base, five hundred miles. In breadth, it is from forty to seventy miles from the summit of the mountain to the termination of the foot hills in the edge of the valleys below, and almost the whole of it available for some useful purpose—timber, pasturage, some arable land, mills, quarries—and so situated as to be convenient for use, the wide slope of the mountain being of easy and practicable descent. Timber holds the first place in the advantages of this slope, the whole being heavily wooded, first with oaks, which predominate to about half the elevation of the mountain; and then with pines, cypress, and cedars, the pines predominating; and hence, called the pine région, as that below is called the oak region, though mixed with other trees. The highest summits of the Sierra are naked, massive granite rock, covered with snow, in sheltered places, all the year round. The oaks are several varieties of white and black oak, and evergreens, some of them resembling live oak. Of the white oak there are some new species, attaining a handsome elevation, upon a stem six feet in diameter. Acorns of uncommon size, and not bad taste, used regularly for food by the Indians, abound on these trees, and will be of great value for stock. The cypress, pine, and cedar are between 100 and 250 feet high, and five to twelve feet in diameter, with clean solid stems. Grass abounds on almost all parts of the slope; except towards the highest summits, and is fresh and green all the year round, being neither killed by cold in the winter, nor dried by want of rain in the summer. The foot hills of the slope are sufficiently fertile and gentle to admit of good settlements; while valleys, coves, beaches, and meadows of arable land are found throughout. Many of the numerous streams, some of them amounting to considerable rivers, which flow down the mountain side, make handsome, fertile valleys. All these streams furnish good water power. The climate in the lower part of the slope is that of constant spring, while above, the cold is not in proportion to the elevation. Such is the general view of the western slope of the great Sierra; but deeming that all general views should rest upon positive data, I add some notes taken from actual observations made in different ascents and descents in the winter and spring of 1845-'46, and in different degrees of latitude from 35° to 41° .

December 4, 1845.—Descent from the pass, at the head of Salmon Trout river, latitude $39^{\circ}.17'$, elevation 7,200 feet. At 3 in the

afternoon the temperature at 46° , at sunset 34° , at sunrise next morning 22° ; the sky perfectly clear; no snow in the pass, but much on the mountain tops. Here the present emigrant road now crosses. A fork of bear river (a considerable stream tributary to Feather river, which falls into the Sacramento) leads from the pass, and the road follows it; but finding this a rugged way, we turned to the south, and camped in a mountain meadow of good green grass. A yellow moss very abundant on the north sides of the pines.

December 6.—The route was over good travelling ground, through open pine forest on a broad, leading ridge, affording an excellent road. A species of cedar (*Thuja gigantea*) occurred, often of extraordinary height and size. *Pinus lambertiani* was one of the most frequent trees, distinguished among cone-bearing tribes by the length of its cones, sometimes sixteen or eighteen inches long. The Indians eat the inner part of the burr, and large heaps of them were seen where they had been collected. Leaving the higher ridges, and gaining the smoother spurs, and descending about 4,000 feet, the face of the country changed rapidly. The country became low, rolling, and pretty; the pines began to disappear, and varieties of oak, and principally an evergreen resembling live oak, became the predominating forest growth. These oaks bear great quantities of large acorns, the principal food of all the wild Indians. At a village of a few huts which we came upon, there was a large supply of these acorns—eight or ten cribs of wicker work, containing about twenty bushels each. The best acorns are obtained from a large tree belonging to the division of white oaks, which is very abundant, and generally forms the groves on the bottom lands of the streams—standing apart, with a clean undergrowth of grass, giving them the appearance of cultivated parks. It is a noble forest tree, already mentioned as a new species, sixty to eighty feet high, with a tufted summit of spreading branches, and frequently attains a diameter of six feet. The largest we measured reached eleven feet. The evergreen oaks generally have a low growth, with long branches and spreading tops. Some of them are suitable for ship timber, and have already been used for that purpose.

At our evening encampment of the 8th, which was at an elevation of five hundred feet above the sea, latitude $38^{\circ} 53'$, and distant from the seacoast about one hundred miles, the temperature at sunset was 48° , the sky clear and calm, weather delightful, and the vegetation that of early spring. We were still upon the foot hills of the mountain, where the soil is sheltered by woods, and where rain falls much more frequently than in the open Sacramento valley, near the edge of which we then were. I have been in copious, continuous rains of eighteen or twenty hours' duration in the oak region of the mountain, when not a drop fell in the valley below. Innumerable small streams have their rise and course through these foot hills, which never reach the river of the valley, but are absorbed in its light soil. The large streams coming from the upper parts of the mountain make valleys of their own, of fertile soil, covered with luxuriant grass and interspersed with groves. This is the general character of the foot hills throughout the entire length

of the Sacramento and San Joaquin valleys—a broad belt of country, and probably destined to become a vine growing, as well as a grain and pastoral country.

December 9.—Entered the valley of the Sacramento. Fresh, green grass for eight or ten miles into the valley, cattle feeding upon it, or lying under the shade of trees—the shade being pleasant to our own feelings. Further in, towards the middle of the valley, where the spring rains had not yet commenced, the country looked parched and dry, the grass eaten down by the cattle, which were quite fat and fine beef.

Ascent, December and January, 1845-'46, latitude 37° . Entering the mountain by the *Rio Reyes* of Tulare lake, (December 24,) we found its general character very similar to what it was in the more northern part, (latitude 39°), the timber perhaps less heavy and more open, and the mountain generally more rough, extremely rocky in the upper parts, but wooded up to the granite ridges which compose its rocky eminences. At the elevation of 3,500 feet the ridges were covered with oaks and pines intermixed, and the bottom lands with oaks, cottonwood, and sycamores. Small varieties of evergreen oaks reached the observed height of 9,480 feet, at which elevation *pinus lambertiani*, and other varieties of pine, fir, and cypress, were large and lofty trees. During the latter part of December and first days of January the average temperature of the oak region, going to about 5,000 feet above the sea, was, at sunrise, 34.6° , and at sunset 50.5° . In the piney region, between this height and 1,100 feet, the average at sunrise was 28.7° , and at sunset $30^{\circ} 4'$. The lowest observed temperature was at sunset of January 1, when the sky had entirely cleared after a severe snow storm. The thermometer then stood at 8.5° , the elevation above the sea being 9,400 feet. Descending to the oak region, spring weather, rain and sunshine, prevailed. At an elevation of 4,500 feet the temperature, at the night encampment of the 3d day of January, was 33° at sunset, and the same at sunrise, the grass green, and growing freshly under the oaks. The snow line was then at about 6,000 feet above the level of the sea. Rain had begun to fall in the valley of the San Joaquin in this latitude (37°) on the 20th of December, and snow at the same time upon the summit of the mountain. The mean temperature of the mountain during this ascent and descent (December 24 to January 8) was 31.6° at sunrise, 40.4° at sunset.

Descent by Mr. Kern's party, latitude $35^{\circ} 30'$, December and January. Mr. Kern, with a detached party, had crossed the Sierra about one hundred miles further south, nearly opposite the head of the Tulare lakes, and remained encamped in a valley or cove, near the summit of the Sierra, at the head of Kern's river, from December 27th to January 17th; the cove well wooded with evergreen oaks, some varieties of pine, firs and cedars, maintaining the usual majestic growth, which characterizes the cone-bearing trees of the Sierra. Until the 12th of January the weather almost that of summer, when the rains commenced, which was almost three weeks later than in latitude 37° . The 17th there was a fall of snow, washed off in the cove by a rain in the afternoon, the high ridges

remaining covered a foot deep. The mean temperature in the cove from December 27th to January 17th was at sunrise 26°, at noon 60°, at sunset 52°. After that, snow and rain, alternated with sunshine, snow remaining on the ridges, and winter set in fairly on all the upper half of the mountain.

Ascent about latitude 41°, (April and May,) April 26, 1846—head of the lower Sacramento valley. Left the river Sacramento, going up one of the many pretty little streams that flow into the river around the head of the lower valley. On either side low, steep ridges were covered along their summits with pine, and oaks occupied the somewhat broad bottoms of the creek. Snowy peaks made the horizon on the right, and the temperature at noon was 71°, but the day was still and hot. The small streams are numerous here and have much bottom land; grass and acorns abundant, and both of excellent quality. Encamped in the evening in latitude 40° 38' 58", elevation above the sea 1,080 feet, temperature at sunset 56°, weather pleasant. Grisly bears numerous, four being killed by the hunters after we had encamped.

April 27.—Found a good way along a flat ridge, a pretty, open mountain stream on the right, the country beginning to assume a mountainous character, wooded with mingled oak and long leaved pine, and having a surface of scattered rocks, with grass and flowers. At noon, crossing a high ridge, the thermometer showed 61°. At night, at an elevation of 2,460 feet, we encamped on a creek that went roaring into the valley; temperature at sunset 52°.

28th, continued up the stream on which we had encamped, the country rising rapidly; clothed with heavy timber. On crossing one of the high ridges, snow and *pinus lambertiani* appeared together. An hour before noon reached the pass in the main ridge, in an open pine forest, elevation 4,600 feet, thermometer at 50°, latitude near 41°. Snow in patches, and deciduous oaks mixed with the pines.

Returning upon a different line, towards the lower valley of the Sacramento, near its head, we found in the descent a truly magnificent forest. It was composed mainly of a cypress and a lofty white cedar (*Thuya gigantea*) 120 to 140 feet high,) common in the mountains of California. All were massive trees; but the cypress was distinguished by its uniformly great bulk. None were seen so large as are to be found in the coast mountains near Santa Cruz, but there was a greater number of large trees—seven feet being a common diameter—carrying the bulk eighty or a hundred feet without a limb. At an elevation of four thousand six hundred feet the temperature at sunset was 48°, and at sunrise 37°. Oaks already appeared among the pines, but did not yet show a leaf. In the meadow marshes of the forest grass was green, but not yet abundant, and the deer were poor. Descending the flanks of the mountain, which fell gradually towards the plain, the way was through the same deep forest. At the elevation of about 3,000 feet the timber had become more open, the hills rolling, and many streams made pretty bottoms of rich grass; the black oaks in full and beautiful leaf were thickly studded among the open pines,

which had become much smaller and fewer in variety, and when we halted near midday, at an elevation of 2,200 feet, we were in one of the most pleasant days of late spring; cool and sunny, with a pleasant breeze, amidst a profusion of various flowers; many trees in dark summer foliage, and some still in bloom. Among these the white spikes of the horse-chesnut, common through all the oak region, were conspicuous. We had again reached summer weather, and the temperature at noon was 70°.

In the afternoon we descended to the open valley of the Sacramento, 1,000 feet lower, where the thermometer was 68°. at sunset, and 54°. at sunrise. This was the best timbered region that I had seen, and the more valuable from its position near the head of the lower valley of the Sacramento, and accessible from its waters.

Bay of San Francisco and dependent country.—The bay of San Francisco has been celebrated, from the time of its first discovery, as one of the finest in the world, and is justly entitled to that character even under the seaman's view of a mere harbor. But when all the accessory advantages which belong to it—fertile and picturesque dependent country; mildness and salubrity of climate; connexion with the great interior valley of the Sacramento and San Joaquin; its vast resources for ship timber, grain and cattle—when these advantages are taken into the account, with its geographical position on the line of communication with Asia, it rises into an importance far above that of a mere harbor, and deserves a particular notice in any account of maritime California. Its latitudinal position is that of Lisbon; its climate is that of southern Italy; settlements upon it for more than half a century attest its healthiness; bold shores and mountains give it grandeur; the extent and fertility of its dependent country give it great resources for agriculture, commerce, and population.

The bay of San Francisco is separated from the sea by low mountain ranges. Looking from the peaks of the Sierra Nevada, the coast mountains present an apparently continuous line, with only a single gap, resembling a mountain pass. This is the entrance to the great bay, and is the only water communication from the coast to the interior country. Approaching from the sea, the coast presents a bold outline. On the south, the bordering mountains come down in a narrow ridge of broken hills, terminating in a precipitous point, against which the sea breaks heavily. On the northern side, the mountain presents a bold promontory, rising in a few miles to a height of two or three thousand feet. Between these points is the strait—about one mile broad, in the narrowest part, and five miles long from the sea to the bay. Passing through this gate,* the bay opens to the right and left, extending in each direction about

* Called *Chrysopylae* (Golden gate) on the map, on the same principle that the harbor of *Byzantium* (Constantinople afterwards) was called *Chrysoceras* (golden horn.) The form of the harbor, and its advantages for commerce, (and that before it became an entrepot of eastern commerce,) suggested the name to the Greek founders of *Byzantium*. The form of the entrance into the bay of San Francisco, and its advantages for commerce, (Asiatic inclusive,) suggest the name which is given to this entrance.

35 miles, having a total length of more than 70, and a coast of about 275 miles. It is divided, by straits and projecting points, into three separate bays, of which the northern two are called San Pablo and Suisoon bays. Within, the view presented is of a mountainous country, the bay resembling an interior lake of deep water, lying between parallel ranges of mountains. Islands, which have the bold character of the shores—some mere masses of rock, and others grass covered, rising to the height of three and eight hundred feet—break its surface, and add to its picturesque appearance. Directly fronting the entrance, mountains a few miles from the shore rise about 2,000 feet above the water, crowned by a forest of the lofty *cypress*, which is visible from the sea, and makes a conspicuous landmark for vessels entering the bay. Behind, the rugged peak of *Mount Diavolo*, nearly 4,000 feet high, (3,770,) overlooks the surrounding country of the bay and San Joaquin. The immediate shore of the bay derives, from its proximate and opposite relation to the sea, the name of *contra costa* (counter-coast, or opposite coast.) It presents a varied character of rugged and broken hills, rolling and undulating land, and rich alluvial shores backed by fertile and wooded ranges, suitable for towns, villages, and farms, with which it is beginning to be dotted. A low alluvial bottom land, several miles in breadth, with occasional open woods of oak, borders the foot of the mountains around the southern arm of the bay, terminating on a breadth of twenty miles in the fertile valley of St. Joseph, a narrow plain of rich soil, lying between ranges from two to three thousand feet high. The valley is openly wooded with groves of oak, free from underbrush, and after the spring rains covered with grass. Taken in connexion with the valley of San Juan, with which it forms a continuous plain, it is fifty-five miles long and one to twenty broad, opening into smaller valleys among the hills. At the head of the bay it is twenty miles broad, and about the same at the southern end, where the soil is beautifully fertile, covered in summer with four or five varieties of wild clover several feet high. In many places it is overgrown with wild mustard, growing ten or twelve feet high, in almost impenetrable fields, through which roads are made like lanes. On both sides the mountains are fertile, wooded, or covered with grasses and scattered trees. On the west it is protected from the chilling influence of the north-west winds by the *cuesta de los gatos*, (wild-cat ridge,) which separates it from the coast. This is a grassy and timbered mountain, watered with small streams, and wooded on both sides with many varieties of trees and shrubbery, the heavier forests of pine and cypress occupying the western slope. Timber and shingles are now obtained from this mountain; and one of the recently discovered quicksilver mines is on the eastern side of the mountain, near the Pueblo of San José. This range terminates on the south in the *Anno Nuevo* point of Monterey bay, and on the north declines into a ridge of broken hills about five miles wide, between the bay and the sea, and having the town of San Francisco on the bay shore, near its northern extremity.

Sheltered from the cold winds and fogs of the sea, and having a

soil of remarkable fertility, the valley of St. Joseph (San José) is capable of producing in great perfection many fruits and grains which do not thrive on the coast in its immediate vicinity. Without taking into consideration the extraordinary yields which have sometimes occurred, the fair average product of wheat is estimated at fifty fold, or fifty for one sown. The mission establishments of *Sana Clara* and *San José*, in the north end of the valley, were formerly, in the prosperous days of the missions, distinguished for the superiority of their wheat crops.

The slope of alluvial land continues entirely around the eastern shore of the bay, intersected by small streams, and offering some points which good landing and deep water, with advantageous positions between the sea and interior country, indicate for future settlement.

The strait of *Carquines*, about one mile wide and eight or ten fathoms deep, connects the San Pablo and Suisoon bays. Around these bays smaller valleys open into the bordering country, and some of the streams have a short launch navigation, which serves to convey produce to the bay. Missions and large farms were established at the head of navigation on these streams, which are favorable sites for towns or villages. The country around the Suisoon bay presents smooth low ridges and rounded hills, clothed with wild oats, and more or less openly wooded on their summits. Approaching its northern shores from *Sonoma* it assumes, though in a state of nature, a cultivated and beautiful appearance. Wild oats cover it in continuous fields, and herds of cattle and bands of horses are scattered over low hills and partly isolated ridges, where blue mists and openings among the abruptly terminating hills indicate the neighborhood of the bay.

The *Suisoon* is connected with an expansion of the river formed by the junction of the Sacramento and San Joaquin, which enter the Francisco bay in the same latitude, nearly, as the mouth of the Tagus at Lisbon. A delta of twenty-five miles in length, divided into islands by deep channels, connects the bay with the valley of the San Joaquin and Sacramento, into the mouths of which the tide flows, and which enter the bay together as one river.

Such is the bay, and the proximate country and shores of the bay of San Francisco. It is not a mere indentation of the coast, but a little sea to itself, connected with the ocean by a defensible gate, opening out between seventy and eighty miles to the right and left, upon a breadth of ten to fifteen, deep enough for the largest ships, with bold shores suitable for towns and settlements, and fertile adjacent country for cultivation. The head of the bay is about forty miles from the sea, and there commences its connexion with the noble valleys of the San Joaquin and Sacramento.

Coast country north of the bay of San Francisco.—Between the Sacramento valley and the coast, north of the bay of San Francisco, the country is broken into mountain ridges and rolling hills, with many very fertile valleys, made by lakes and small streams. In the interior it is wooded, generally with oak, and immediately along the coast presents open prairie lands, among heavily timbered for-

ests, having a greater variety of trees, and occasionally a larger growth than the timbered region of the Sierra Nevada. In some parts it is entirely covered, in areas of many miles, with a close growth of wild oats, to the exclusion of almost every other plant. In the latter part of June and beginning of July, we found here a climate sensibly different from that of the Sacramento valley, a few miles east, being much cooler and moister. In clear weather, the mornings were like those of the Rocky mountains in August, pleasant and cool, following cold clear nights. In that part lying nearer the coast, we found the mornings sometimes cold, accompanied with chilling winds; and fogs frequently came rolling up over the ridges from the sea. These sometimes rose at evening, and continued until noon of the next day. They are not dry, but wet mists, leaving the face of the country covered as by a drizzling rain. This sometimes causes rust in wheat grown within its influence, but vegetables flourish and attain extraordinary size.

I learned from Captain Smith, a resident at *Bodega*, that the winter months make a delightful season—rainy days (generally of warm showers) alternating with mild and calm, pleasant weather, and pure bright skies—much preferable to the summer, when the fogs and strong northwest winds, which prevail during the greater part of the year, make the morning part of the day disagreeably cold.

Owing probably to the fogs, spring is earlier along the coast than in the interior, where, during the interval between the rains, the ground becomes very dry. Flowers bloom in December, and by the beginning of February grass acquires a strong and luxuriant growth, and fruit trees (peach, pear, apple, &c.) are covered with blossoms. In situations immediately open to the sea the fruit ripens late, generally at the end of August, being retarded by the chilling influence of the northwest winds: a short distance inland, where intervening ridges obstruct these winds and shelter the face of the country, there is a different climate and a remarkable difference in the time of ripening fruits; the heat of the sun has full influence on the soil, and vegetation goes rapidly to perfection.

The country in July began to present the dry appearance common to all California as the summer advances, except along the northern coast within the influence of the fogs, or where the land is sheltered by forests, and in the moist vallies of streams and coves of the hills. In some of these was an uncommonly luxuriant growth of oats, still partially green, while elsewhere they were dried up; the face of the country presenting generally a mellow and ripened appearance, and the small streams beginning to lose their volume, and draw up into the hills.

This northern part of the coast country is heavily timbered, more so as it goes north to the Oregon boundary, (42°,) with many bold streams falling directly into the sea.

The country between the bays of San Francisco and Monterey.—In the latter part of *January*, 1846, a few shrubs and flowers were already in bloom on the sandy shore of Monterey bay (lat. 36° 40'.) Among these were the California poppy, and *nemophila insignis*.

On the 5th Eebruary I found many shrubs and plants in bloom, in the coast mountains bordering St. Joseph's valley, between Monterey and the bay of San Francisco; and vegetation appeared much more green and spring-like, and further advanced, than in the plains. About the middle of February I noticed the *geranium* in flower in the valley; and from that time vegetation began generally to bloom. Cattle were obtained in February, from ranchos among the neighboring hills, extremely fat, selected from the herds in the range.

During the months of January and February rainy days alternated with longer intervals of fair and pleasant weather, which is the character of the rainy season in California. The mean temperature in the valley of St. Joseph—open to the bay of San Francisco—from the 13th to the 22d of February, was 50° at sunrise, and 61° at sunset. The oaks in this valley, especially along the foot of the hills, are partly covered with long hanging moss—an indication of much humidity in the climate.

We remained several days, in the latter part of February, in the upper portion of the coast mountain between St. Joseph and Santa Cruz. The place of our encampment was 2,000 feet above the sea, and was covered with a luxuriant growth of grass, a foot high in many places. At sunrise the temperature was 40°; at noon 60°; at 4 in the afternoon 65°; and 63° at sunset; with very pleasant weather. The mountains were wooded with many varieties of trees, and in some parts with heavy forests. These forests are characterized by a cypress (*taxodium*) of extraordinary dimensions, already mentioned among the trees of the Sierra Nevada, which is distinguished among the forest trees of America by its superior size and height. Among many which we measured in this part of the mountain, nine and ten feet diameter was frequent—eleven sometimes; but going beyond eleven only in a single tree, which reached fourteen feet in diameter. Above two hundred feet was a frequent height. In this locality the bark was very deeply furrowed, and unusually thick, being fully sixteen inches in some of the trees. The tree was now in bloom, flowering near the summit, and the flowers consequently difficult to procure. This is the staple timber tree of the country, being cut into both boards and shingles, and is the principal timber sawed at the mills. It is soft, and easily worked, wearing away too quickly to be used for floors. It seems to have all the durability which anciently gave the cypress so much celebrity. Posts which have been exposed to the weather for three quarters of a century (since the foundation of the missions) show no marks of decay in the wood, and are now converted into beams and posts for private buildings. In California this tree is called the *palo colorado*. It is the king of trees.

Among the oaks is a handsome lofty evergreen species, specifically different from those of the lower grounds, and in its general appearance much resembling hickory. The bark is smooth, of a white color, and the wood hard and close grained. It seems to prefer the north hill sides, where some were nearly four feet in diameter and a hundred feet high.

Another remarkable tree of these woods is called in the language of the country *madrono*. It is a beautiful evergreen, with large, thick, and glossy digitate leaves, the trunk and branches reddish colored, and having a smooth and singularly naked appearance, as if the bark had been stripped off. In its green state the wood is brittle, very heavy, hard, and close grained; it is said to assume a red color when dry, sometimes variegated, and susceptible of a high polish. This tree was found by us only in the mountains. Some measured nearly four feet in diameter, and were about sixty feet high.

A few scattered flowers were now showing throughout the forests, and on the open ridges shrubs were flowering; but the bloom was not yet general.

On the 25th February, we descended to the coast near the north-western point of Monterey bay, losing our fine weather, which in the evening changed into a cold southeasterly storm, continuing with heavy and constant rains for several days.

During this time the mean temperature was 53° at sunrise, $56^{\circ}.5$ at 9h., a. m., $57^{\circ}.5$ at noon, $54^{\circ}.5$ at 2h. in the afternoon, $53^{\circ}.4$ at 4, and $52^{\circ}.7$ at sunset. On the 28th, a thick fog was over the bay and on the mountains at sunrise, and the thermometer was at 38° — 15° below the ordinary temperature—rising at 9 o'clock to 59° . These fogs prevail along the coast during a great part of the summer and autumn, but do not cross the ridges into the interior. This locality is celebrated for the excellence and great size of its vegetables, (especially the Irish potato and onions,) with which, for this reason, it has for many years supplied the shipping which visits Monterey. A forest of *palo colorado* at the foot of the mountains in this vicinity, is noted for the great size and height of the trees. I measured one which was 275 feet in height and fifteen feet in diameter, three feet above the base. Though this was distinguished by the greatest girth, other surrounding trees were but little inferior in size and still taller. Their colossal height and massive bulk give an air of grandeur to the forest.

These trees grow tallest in the bottom lands, and prefer moist soils and north hill sides. In situations where they are protected from the prevailing northwest winds, they shoot up to a great height; but wherever their heads are exposed, these winds appear to chill them and stop their growth. They then assume a spreading shape, with larger branches, and an apparently broken summit.

The rain storm closed with February, and the weather becoming fine, on the 1st of March we resumed our progress along the coast. Over the face of the country between Santa Cruz and Monterey, and around the plains of St. John, the grass, which had been eaten down by the large herds of cattle, was now everywhere springing up; flowers began to show their bloom, and in the valleys of the mountains bordering the Salinas plains, (a plain of some fifty miles in length, made by the Salinas river,) wild oats were three feet high, and well headed, by the 6th of March.

During three days that we remained on one of these mountains,

delightful. The days were hot, at evening cool, and the morning weather clear and exhilarating. Descending into the valley, we found it open and handsome, making a pleasing country, well wooded, and everywhere covered with grass of a good quality. The coast range is wooded on both sides and to the summit with varieties of oaks and pines. The upper part of the Salinas valley, where we are now travelling, would afford excellent stock farms, and is particularly well suited to sheep. The country never becomes miry in the rainy season, and none are lost by cold in the mild winter.

The good range, grass and acorns, made game abundant, and deer and grisly bear were numerous. Twelve of the latter were killed by the party in one thicket.

Lower down, in the neighborhood of San Miguel, the country changed its appearance, losing its timbered and grassy character, and showing much sand. The past year had been one of unusual drought, and the river had almost entirely disappeared, leaving a bare sandy bed with a few pools of water. About fifteen miles below San Miguel it enters a gorge of the hills, making broad thickly wooded bottoms, and affording good range and abundance of water, the bed being sheltered by the thick timber. The lower hills and spurs from the ranges, bordering the river, are very dry and bare, affording little or no grass. Approaching the mission of *Soledad* the river valley widens, making fertile bottoms and plains of arable land, some fifteen to twenty miles broad, extending to Monterey bay, and bordered by ranges of mountain from two to three thousand feet high. These ranges have the character of fertile mountains, their hills being covered with grass and scattered trees, and their vallies producing fields of wild oats, and wooded with oak groves. Being unsheltered by woods, water is not abundant in the dry season, but at the end of September we found springs among the hills, and water remained in the creek beds.

On the evening of the 25th September, *cumuli* made their appearance in the sky, and the next morning was cloudy with a warm southerly wind and a few drops of rain—the first of the rainy season. The weather then continued uninterruptedly dry through all October—fair and bright during the first part, but cloudy during the latter half. At the end of the month the rainy season sat in fully, consisting generally of rain squalls with bright weather intervening, and occasional southeasterly storms continuing several days. The previous seasons had been very short and light for several years, and the country had suffered from the consequent drought. The present season commenced early, and was very favorable. Much rain fell in the low country, and snow accumulated to a great depth in the high mountains. The first rains changed the face of the country. Grass immediately began to shoot up rapidly, and by the end of the first week of *November* the dead hue of the hills around Monterey had already given place to green.

A brief sketch of the weather during a journey in this year from the mission of *San Juan Bautista* (latitude 37°) to *los Angeles* will exhibit the ordinary character of the season.

In the valley of San Juan, during the latter half of *November*, there was no rain; the weather, generally, pleasant and bright, with occasional clouds. The night clear and cool, occasionally cold; the mornings clear and sharp, with hoar frost sometimes covering the ground. The days were warm and pleasant, and the evenings mild and calm. On some mornings a thick fog settled down immediately after sunrise, but in a few hours cleared off into a pleasant day.

The falling weather recommenced on the 30th, with a stormy day of spring; blue sky in spots, rapidly succeeded by masses of dark clouds and pouring rain, which fell heavily during greater part of the night.

The morning of the 1st *December* was partially clear, but rain recommenced in a few hours, with sky entirely clouded. The weather brightened at noon, and from a high point of the hills bordering the St. Juan river valley, up which we were travelling, snow was visible on summits of the dividing range between the San Joaquin valley and the coast. It rained heavily and incessantly during the night, and continued all the next day. In the night the sky cleared off bright with a north wind, but clouded up at morning, with rain and a broken sky. There were showers of rain during the day, with intervals of bright and hot sun; and the sky at sunset was without a cloud.

During the day and night of the 4th, there were occasional showers. The sky was tolerably clear on the morning of the 5th, with a prospect of fair weather. The tents were frozen, and snow appeared on the near ridges. We were then in a small interior valley of the mountains, bordering the *Salinas* river, and about 1,000 feet above the sea.

December the 6th was a beautiful day, followed by a cold frosty night.

The next day we descended to the valley of the *Salinas* river, the weather continuing clear and pleasant during the day. Snow appeared on the mountains on both sides of the valley, and a cloud from some of them gave a slight shower during the night. Several successive days were clear, with hot sun; the nights cold, starry, and frosty. The new grass on the hills was coming out vigorously. The morning of the 10th was keen and clear, with scattered clouds, and a southerly wind, which brought up showers of rain at night, followed by fog in the morning.

On the 12th, at the mission of *Santa Margarita*, in the head of the *Salinas* valley, rain began in the afternoon, with a cold wind, and soon increased to a southeasterly storm, with heavy rain during all the night. The 13th was cloudy, with occasional showers. During the night the weather became very bad, and by morning had increased to a violent and cold southeasterly rain storm. In the afternoon the storm subsided, and was followed by several days of variable weather.

By the 19th, the country where we were travelling between *San Luis Obispo* and the *Cuesta of Santa Ines*, showed a handsome covering of grass, which required two weeks more to become ex-

peditions which I have conducted, and which enable me to know what parts of the country most require examination, one year more of labor in the field would furnish me additional materials sufficient to complete a map of these countries, with topographical and descriptive maps of their most valuable parts, and a general map of the whole from the Mississippi river to the Pacific ocean. Having been many years engaged in this geographical labor, and having made so much progress in it, I should be much gratified with an opportunity to complete it in the public employ; and I respectfully submit the subject to the consideration of your honorable body.

This geographical memoir, as stated in the beginning, is only a preliminary sketch in anticipation of a fuller publication, which the observations of the last expedition would justify, but not sufficient to give the full view of Oregon and California which the increasing importance of those countries demands. The publication of the results of this expedition, with or without further additions from another exploration, is respectfully submitted to your consideration. The results of the previous two expeditions were published by order of the Senate, and disposed of according to its pleasure. No copy-right was taken; and whatever information the journals of the two expeditions contained, passed at once into general circulation. I would prefer a similar publication of the results of the last expedition; but being no longer in the public service, an arrangement for the preparation and the superintendence of the publication would be necessary.

All which is respectfully submitted:

J. CHARLES FRÉMONT.

WASHINGTON, *June*, 1848.

APPENDIX.

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- I. Note from Professor Hubbard, (of the National Observatory, Washington city,) describing the instruments used by J. C. Frémont in making the astronomical observations in his third or last expedition, and the methods followed by Professor Hubbard in reducing them.
 - II. A table of astronomical observations made by J. C. Frémont at the four principal stations determined in this third expedition, namely: 1. The mouth of Fontaine Qui Bouit, on the upper Arkansas. 2. Southeastern shore of the Great Salt lake. 3. Lassen's farm, Deer creek, in the valley of the Sacramento. 4. The Three Buttes, valley of the Sacramento.
 - III. A table of latitudes and longitudes, deduced from the foregoing astronomical observations, calculated by Professor Hubbard.
 - IV. Meteorological observations made in the Great Basin from December 16, 1843, to February 22, 1844.
 - V. Meteorological observations made in the Sacramento and San Joaquin valleys from March 9 to April 11, 1844.

I.

Note from Professor Hubbard.

The instruments employed in the determination of astronomical positions were—

A portable transit instrument, by Young, of Philadelphia.

A sextant, by Troughton.

A sextant, by Gambey.

Two pocket chronometers, (Nos. 438 and 443,) by Appleton.

The transit instrument was made by Mr. William J. Young, of Philadelphia. The length of the telescope was 26 inches, the diameter of the object glass $2\frac{1}{2}$ inches, and the axis 16 inches between the shoulders. A circle was attached to the instrument, having a diameter of 11 inches, graduated to read to 10 seconds, and furnished with 3 verniers. The stand was of iron, and 4 feet in height.

Of the sextants, the one by Gambey, a new instrument, was most frequently used. The other, by Troughton, is the same that was carried in the previous exploration, and was now only used in observing at night, its divided arc being more readily illuminated than that of the other. The index errors of both were carefully and often determined, in order that any possible change of adjustment might be readily detected.

The sextant observations consist of single altitudes of a star or the sun for time, and of Polaris or a star in the south, for latitude. They have been reduced in the usual manner, the formulæ being too well known to need quoting. All the latitudes, and the several links of the chain of longitudes connecting the primary stations, depend upon the data thus furnished. In deducing the differences of longitude, in order to obviate, so far as possible, all error arising from eccentricity of the sextant or any like cause, comparison has been made, when practicable, with observations in the same quarter of the heavens.

The rates of the chronometers depend entirely upon sextant observations. The comparison of these rates, determined at different times and under different circumstances of climate and usage, has shown that but one of the chronometers (No. 438) was entitled to confidence. All differences of longitude from the principal stations have therefore been determined by this one, and the results thus obtained are, as will hereafter be seen, highly satisfactory. The following are the observed rates, deduced, with but a single exception, from altitudes of the sun; the sign + indicates a gaining rate:

Locality.	Dates of observation.	Rate of 443.	Rate of 438.
		s.	s.
Bent's fort.....	1845, Aug. 3 to Aug. 15	+ 2.020	+ 3.386
Camp at Salt lake	" Oct. 14 to Oct. 20	+ 0.883	3.317
Laguna farm.....	1846, Feb. 11 to Feb. 19	— 1.754	2.146
	" Mar. 30 to April 14	.....	2.193
	" April 14 to May 22	.....	+ 2.980

The whole route has been divided into three distinct lines. The first, commencing at Bent's fort, extends to the camp of January 4, 1846. The chronometers were then for a time subjected to a rapid travel over a rough road, and their rates were thereby changed. The second line commences with the Laguna farm, between which

and the camp of January 4 no observations were made, and extends to the camp of March 30—April 14, where the chronometers stopped, and another change of rate took place. The last line extends from this camp to that of June 7, after which date no more longitudes were determined.

By combining the above rates for the same line, giving to each a weight equivalent to the number of days elapsed between the observations on which it depends, we get the following:

Rates of chronometer No. 438.

	s.
August 21, 1845 to January 4, 1846.....	+ 3.363
February 18, 1846, to March 30, 1846.....	+ 2.175
April 14, 1846, to June 7, 1846.....	+ 2.980

The transit instrument has given, by moon culminations, the longitudes of four camps with an accuracy much more than sufficient for ordinary geographical purposes. These camps being connected, as we have already seen, by chronometric differences, an excellent check of the whole work is thus afforded. When we remember that an error of one second of time in the observed transit of the moon induces an average error in the resulting longitude of the place of nearly seven minutes of arc, the agreement of these independent determinations, thus referred to the same point, is unexpectedly great. The following is the method by which the transit observations have been reduced:

An estimated longitude for each of the camps in question, gave the means of computing with sufficient accuracy the "the tabular mean time of transit" of the stars observed; their places in the heavens being taken from the catalogue of the British Association. The "observed mean time of transit" was next to be obtained. Where the passage of the star over all the wires had been observed, the mean, reduced to the middle wire, gave at once the time sought. For the purpose of correcting imperfect transits, a

determination of the equatoreal intervals of the transit wires was necessary. These wires were originally seven in number; their intervals are given below (I.) They were broken out after the 21st of October, 1845, and were replaced by a set of five (II,) which in their turn were broken, and the last set (III) inserted. Of these last, the second wire was broken before the commencement of observations, and the reduction of the mean to the middle wire, of course includes the correction for the deficiency. The following, then, are the adopted intervals of the several wires and the mean of the whole from the middle wire:

No.	Dates.	A.	B.	C.	Mean.	E.	F.	G.
	1845.	s.	s.	s.	s.	s.	s.	s.
I.	Aug. 12 to Oct. 21 1846.	+55.49	+36.78	+18.52	+00.69	-18.12	-34.63	-53.18
II.	April 14 to April 23	.....	36.59	17.99	00.00	18.14	36.45	
III.	June 4 to June 6....	+54.96	.....	+18.84	-05.17	-17.41	-35.19	-51.95

From this table, the corrections to the mean of wires for imperfect transits have been deduced by dividing the sum of the intervals for the wires observed by the product of the number of wires into the cosine of the star's declination. In the single case of an imperfect transit of the moon, allowance has been made for the moon's motion during the interval of time indicated by the correction.

In deducing the instrumental and chronometer errors by comparison of the observed and computed times of transit, the formula of M. Hansen has been employed.

Denoting by L the latitude of the place.

D the declination of the star.

Z the zenith distance of the star.

i the correction of instrument for error of level.

n the correction of instrument for deviation at the pole.

c the correction of instrument for error of collimation.

Then the reduction of the observed transit to the meridian has the form

$$i \sec L - n \sin Z \sec L \sec D + c \sec D.$$

The value of one division of the level tube accompanying the instrument was unknown; and the instrument itself being in California, this value could not be determined; but, knowing from the observing-books that the axis was always kept as nearly horizontal as possible, we may neglect the constant term $i \sec L$, or rather may include it in the chronometer correction, and this without affecting the observed right ascensions.

Denote also by A the computed mean time of star's transit.

T the observed mean time of star's transit.

ΔT the correction of the chronometer.

Then every observation will give an equation of the following form:

$$O = T + \Delta T - A - \sin Z \sec L \sec D n + \sec D c.$$

Or for brevity:

$$O = T + \Delta T - A - a n + b c.$$

putting a and b for the co-efficients of n and c . By help of this formula, approximate values were obtained for n and c from two or more observations. These were generally taken on different days, and the equations furnished by them were only limited by the condition that the value of c should remain constant for these days, allowance being afterwards made for the error of this assumption. The values of n and c thus obtained, were substituted in the equation furnished by each observation. The mean of the chronometer corrections thus determined, being compared with the individual results, a new set of equations of condition was arranged, of the following form:

$$O = d\Delta T - a. dn + b. dc.$$

where $d\Delta T$ is the residual quantity obtained by the above comparison. The solution of these differential equations by the method of least squares, gave the corrections of n and c , which, applied to the assumed, gave the most probable values. The assumed and adopted n and c are given below. The application of these final values to the original equations gave now the most probable chronometer correction, and this, applied to the corrected transit of the moon's limb, gave the mean time of transit, and finally the right ascension.

Table of assumed and adopted values of n and c .

Date.	Assumed.		Adopted.	
	n .	c .	n .	c .
	s .	s .	s .	s .
1845, August 21, 22.....	+ 3.702	-3.237	+ 3.702	-3.237
October 20.....	+ 1.633	-3.237	+ 1.343	-3.062
1846, April 14.....	+ 1.02	+0.183	+ 1.648	+0.890
16.....	+52.07	+0.183	+52.265	-0.084
June 4.....	} + 0.574	-0.145	{ + 0.574	-0.145
5.....				-0.183

The following longitudes were assumed as the basis of the comparison of the observed with the tabulated moon culminations:

	h .	m .	s .
I. 1845, August 22	6	58	30
II. 1845, October 20.....	7	29	31
III. 1846, April 14.....	8	08	20
IV. 1846, June 4.....	8	01	52

By help of these, the moon's R and hourly motion at transit were computed from the moon-culminating list of the Nautical Almanac, using fourth differences. A comparison of the computed R with that observed, gave the numerator—the hourly motion being the denominator—of the fraction expressing the correction of the assumed longitudes. Those corrections, and the resulting longitudes, are as follows:

	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
I. +0	15.52		6	58	45.52
II. —1	15.65		7	28	15.35
III. —0	37.54		8	07	42.46
IV. +4	36.70		8	06	28.70

Camps I and II, as well as III and IV, being connected by chronometric differences, it becomes important to test the results above given by a comparison of the two differences. We have then

	<i>m.</i>	<i>s.</i>	<i>m.</i>	<i>s.</i>
By lunars	29	29.83	1	13.76
By chró.	29	33.83	1	10.67
L—C	—4.00		+3.09	

The chronometric difference is adopted as the most exact—apportioning the errors of the other among the longitudes by lunars, remembering that camp II is determined by a single culmination, while at each of the others two were observed, we should now have, were the lunar tables correct, the best system of longitudes. Mr. S. C. Walker states that a correction of the present residual errors of the lunar tables, would increase all the longitudes depending upon moon culminations by about six seconds of time. Adding, therefore, six seconds to the above corrected longitudes, we get finally, as the basis of the whole work, the following adopted longitudes.

	<i>h.</i>	<i>m.</i>	<i>s.</i>		
I. Mouth of the Fontaine-qui-bouit, August 22, 1844	6	58	50.72=104	42	41
II. Camp at Salt Lake, October 14, 20	7	28	24.55=112	06	03
III. Lassen's farm, Deer creek, April 14, 1846	8	07	46.92=121	56	44
IV. Buttes Sacramento valley, June 4, 1846	8	06	36.24=121	39	04

Upon these and the sextant observations, is based the accompanying table of latitudes and longitudes.

J. S. HUBBARD.

OBSERVATIONS

WITH

THE TRANSIT INSTRUMENT.

ment, determining the four principal positions mentioned in his memoir Hubbard.

Mean of obs'd. wires.	REDUCTIONS TO		Observed transit.	Computed transit.	Chronometer fast.	Reference No.
	Mid. wire.	Meridian.				

THE FONTAINE-QUI-BOUIT.

H. M. S.	M. S.	M. S.	H. M. S.	H. M. S.	H. M. S.	
15 44 41.20	+ 0 00.72	- 0 05.29	15 44 36.63	15 20 57.04	0 23 39.59	1
16 21 57.16	0 00.72	0 05.29	16 21 52.59	.....	.....	2
16 30 52.47	+ 0 00.73	- 0 05.09	16 30 48.11	16 07 08.36	0 23 39.75	3
10 01 43.11	+ 0 00.71	- 0 05.64	10 01 38.18	9 37 58.02	0 23 40.16	4
14 53 30.29	0 00.73	- 0 07.61	14 53 23.41	14 29 45.08	0 23 38.33	5
15 21 25.06	+ 0 26.32	+ 0 14.54	15 22 05.92	14 58 25.22	0 23 40.70	6
16 05 28.75	- 1 06.78	- 0 03.23	16 04 18.74	15 40 34.95	0 23 43.79	7†
16 26 57.83	+ 0 00.73	0 05.06	16 26 53.50	16 03 12.48	0 23 41.02	8
16 39 43.71	0 00.73	0 05.18	16 39 39.26	16 15 58.46	0 23 40.80	9
17 10 45.67	+ 0 00.73	- 0 05.25	17 10 41.15	.....	.....	10

SALT LAKE.

12 25 24.67	-22 22.51	- 1 13.08	12 01 49.08	11 06 38.20	0 55 10.88	11†
13 47 46.14	- 0 02.64	+ 0 06.63	13 47 50.13	12 52 34.16	0 55 15.97	12†
14 47 23.90	+ 0 00.72	- 0 03.82	14 47 20.80	13 52 08.92	0 55 11.88	13
16 03 29.37	0 00.70	0 03.63	16 03 26.39	15 03 13.81	0 55 12.58	14
16 22 13.20	0 00.73	0 03.95	16 22 09.98	15 26 58.70	0 55 11.28	15
16 41 32.73	0 00.74	0 03.39	16 41 30.08	15 46 14.99	0 55 15.09	16
16 51 01.83	0 00.74	0 03.39	16 50 59.18	15 55 44.04	0 55 15.14	17
17 30 44.81	0 00.74	0 03.39	17 30 42.16	.....	.....	18
17 51 02.77	+ 0 00.74	- 0 03.38	17 51 00.13	16 55 45.67	0 55 14.46	19

SACRAMENTO VALLEY.

15 51 34.34	.....	- 0 00.76	15 51 33.53	11 44 45.72	4 06 47.86	20
18 30 33.12	.....	0 01.02	18 30 32.10	14 23 43.80	4 06 48.30	21
19 14 51.06	.....	- 0 01.02	19 14 50.04	.....	.....	22
20 23 36.90	+ 1 20.78	+ 0 09.70	20 30 07.33	16 23 19.30	4 06 48.08	23
20 33 15.64	.....	- 0 01.06	20 38 14.53	16 31 26.13	4 06 48.45	24
14 15 57.80	- 0 16.56	- 2 03.19	14 13 38.05	10 06 43.24	4 06 54.81	25
14 29 59.80	.....	2 08.41	14 27 51.39	10 20 58.16	4 06 53.23	26
14 54 14.30	.....	1 05.42	14 53 08.88	10 46 15.59	4 06 53.29	27
15 00 35.82	.....	2 00.06	14 53 35.76	10 51 41.74	4 06 54.02	28
16 03 53.84	.....	33 48.98	15 30 09.86	11 23 18.86	4 06 51.00	29†
20 01 17.50	.....	1 04.33	20 00 13.12	15 53 17.58	4 06 55.54	30
20 31 32.88	.....	1 03.85	20 30 29.03	16 23 34.37	4 06 54.66	31
21 09 57.46	.....	- 1 03.00	21 08 54.46	.....	.....	32

OBSERVATIONS

Date.	Reference No.	Object.	Declination	TRANSITS OBSERVED.						
				I.	II.	III.	IV.	V.	VI.	VII.
1845.										
THREE BUTTES, SA										
June 4	33	γ Virginis.....	— 0 36	....	....	54.7	13.0	30.2	48.7	05.0
	34	Moon's I L....	— 8 24	10.0	....	48.2	07.0	25.2	43.8	01.2
	35	Polaris, S. P...	+ 91 31	25.2	....	....	....	....	13.5	23.0
	36	α Virginis.....	— 10 22	23.0	....	01.7	19.0	37.7	55.7	12.7
	37	ϕ Centauri.....	— 41 21	55.0	..	42.0	06.5	30.5	54.8	17.0
	38	θ Centauri.....	— 35 37	40.7	....	25.2	47.7	09.7	31.6	52.3
	39	ϵ Lupi.....	— 45 21	24.7	....	15.6	41.8	07.7	33.0	56.5
	40	δ Ursæ Minoris.	+ 76 23	....	....	36.0	54.2	11 0	26.5	38.2
	41	δ Ursæ Minoris.	+ 74 47	....	....	53.0	10.0	16 8	23.7	29.0
June 5	42*	θ Virginis.....	— 4 43	....	....	....	....	40.2	....	16.0
	43	Polaris, S. P..	+ 91 31	51.0	54.5	....	50.0	....	....	34.2
	44	α Virginis.....	— 10 22	32.2	50.0	07.3	24.3	42.7	....	20.2
	45	ω Cassiopeiæ, S.P	+ 112 45	34.5	52.0	04.2	....	....	....	....
	46	ϵ Cassiopeiæ, S.P.	+ 117 06	....	55.3	16.5	40.2	57.5	....	38.2
	47	ψ Centauri.....	— 41 21	02.2	25.0	48.5	10.0	36.2	....	....
	48	Moon I L.....	— 12 11	20.5	39.2	57.5	15.0	35.2	....	13.0
	49	θ Centauri.....	— 35 37	48.5	09.0	31.2	52.0	15.2	....	00.2
	50	χ Virginis.....	— 9 33	00.2	17.5	35.5	52.5	12.0	....	49.2
	51	λ Virginis.....	— 12 39	05.5	22.5	40.0	57.2	17.2	....	54.5
	52	δ Ursæ Minoris..	+ 76 23	16.5	28.8	45.2	58.2	19.0	....	51.6
	53	α^2 Libræ.....	— 15 24	34.5	52.3	10.2	26.6	48.2	....	25.2
	54	β Ursæ Minoris..	+ 74 47	....	....	....	10.2	25.6	....	43.0

* Instrument reversed between observations 41 and 42.

—Continued.

Mean of obs'd. wires.	REDUCTIONS TO		Observed transit.	Computed transit.	Chronometer fast.	Reference No.
	Mid. wire.	Meridian.				

CRAMENTO VALLEY.

H. M. S.	M. S.	M. S.	H. M. S.	H. M. S.	H. M. S.	
11 49 30.32	— 0 17.14	— 0 00.62	11 49 12.56	7 41 07.60	4 03 04.96	33
12 16 1 ⁵ .57	— 0 05.30	0 00.72	12 16 06.55	.....	.....	34
12 12 40.57	+ 6 46.18	0 16.69	12 19 10.06	8 11 05.46	4 08 04.60	35
12 32 24.97	— 0 05.26	0 00.72	12 32 18.99	8 24 14.59	4 08 04.40	36
13 04 14.30	0 05.90	0 01.17	13 04 07.23	8 56 01.28	4 08 05.95	37†
13 12 54.53	0 06.36	0 01.05	13 12 47.12	9 04 41.92	4 08 05.20	38
13 24 49.88	0 07.35	— 0 01.21	13 24 41.32	9 16 36.71	4 08 04.61	39
13 44 09.19	1 12.84	+ 0 01.28	13 42 57.63	9 34 52.72	4 08 04.91	40
14 07 15.50	— 0 05.32	+ 0 01.09	14 07 11.27	9 53 07.06	4 08 04.21	41
12 13 58.10	— 0 37.03	— 0 00.43	12 13 20.64	8 05 14.71	4 08 05.93	42
12 20 47.42	— 5 04.71	0 33.56	12 15 09.15	8 07 10.32	4 07 58.83	43†
12 24 19.45	+ 0 05.26	0 00.50	12 28 24.21	8 20 18.69	4 08 05.52	44
12 43 50.23	— 1 30.14	0 02.67	12 42 17.42	8 34 11.41	4 08 06.01	45
12 54 29.54	+ 0 09.31	0 02.31	12 54 36.54	8 46 30.48	4 08 06.06	46
12 59 48.38	0 22.83	0 00.93	13 00 10.28	8 52 05.37	4 08 04.91	47
13 04 10.07	0 05.40	0 00.53	13 04 14.94	.....	.....	48
13 08 46.02	0 06.36	0 00.83	13 08 51.55	9 00 46.01	4 08 05.54	49
13 15 47.82	0 05.24	0 00.51	13 15 52.55	9 07 47.30	4 08 05.25	50
13 21 52.82	0 05.30	— 0 00.53	13 21 57.59	9 13 52.18	4 08 05.41	51
13 38 36.55	0 21.97	+ 0 03.06	13 39 01.58	9 30 56.77	4 08 04.81	52
13 53 22.83	+ 0 05.36	— 0 00.56	13 53 27.63	9 45 22.11	4 08 05.52	53
14 03 46.27	— 1 33.75	+ 0 02.67	14 02 15.19	9 54 11.13	4 08 04.06	54†

† Omitted in taking the mean.

III.—A table of latitudes and longitudes deduced from the foregoing astronomical observations, calculated by Professor Hubbard.

Date.	Latitude.	Longitude.	Locality.
1845.			
Aug. 16	38° 02' 22"	103° 33' 20"	Bent's Fort.
22	38° 15' 18"	104° 42' 41"	Mouth of the Fontaine-qui-bouit.
26	38° 25' 44"	105° 22' 17"	Arkansas river, at mouth of the great cañon, left bank.
28	38° 43' 17"	105° 39' 50"	Sheep river—Utah pass.
29	38° 50' 35"	105° 49' 56"	Head water of a tributary to the Arkansas river, (heading in the ridge between Platte and Arkansas waters.)
30	38° 49' 43"	106° 17' 56"	Piney fork of the Arkansas, three miles above its mouth.
Sept. 1	38° 45' 12"	106° 30' 03"	On the lake fork of the Arkansas, on the western shore of the upper lake, near the inlet.
2	38° 20' 34"	106° 27' 15"	Head waters of the main branch of the Arkansas river.
4	38° 33' 48"	106° 32' 03"	On Piney river—an affluent of Grand river of the Colorado of the gulf of California.
5	38° 39' 12"	106° 44' 21"	Williams's fishery—Piney river.
8	38° 46' 21"	107° 08' 55"	Grand river of the gulf of California.
12	39° 56' 51"	107° 44' 57"	White river, (affluent of Green river of the Colorado,) at "flat prairie."
13	39° 57' 36"	107° 47' 26"	Forks of White river.
17	39° 55' 57"	108° 45' 08"	Guthrie's creek, (of White river.)
21	40° 03' 55"	109° 05' 28"	"War Eagle camp," White river.
25	40° 04' 00"	109° 53' 43"	Green river of the Colorado, left bank, one and a half mile above the mouth of White river.
27	40° 11' 40"	110° 16' 35"	Lake fork, (of the Uintah,) two miles above its mouth.
29	40° 19' 38"	110° 52' 05"	Duchénes fork, (of the Uintah.)
Oct. 1	40° 27' 42"	111° 10' 49"	Morin's fork.
2	40° 32' 05"	111° 21' 31"	On a branch of the Timpana-ozu or Timpanogos river, (of the Utah lake.)
4	40° 28' 04"	111° 39' 44"	Timpanogos river.
6	40° 13' 12"	111° 54' 55"	Timpanogos river.
10	40° 09' 53"	111° 47' 51"	Punquan creek, shore of the Utah lake.
12	40° 33' 27"	112° 02' 32"	Outlet of Utah lake, at mouth of Huglos's creek.
14	40° 45' 53"	112° 06' 08"	Summit of peak of Antelope island, in the southern part of Great Salt lake.
18	40° 58' 48"	112° 06' 08"	Spring point, (extremity of a promontory at south end of Salt lake, opposite Antelope island.)
21	40° 42' 19"	112° 51' 11"	Spring in valley, opening on southern shore of the Great Salt lake.
23	40° 39' 15"	113° 05' 09"	Valley, near southwestern shore of Salt lake.
25	40° 38' 17"	114° 11' 09"	Pilotpeak creek.
30	41° 00' 28"	114° 26' 22"	Spring at head of ravine.
Nov. 1	40° 43' 49"	114° 55' 45"	Whitton's spring.
3	40° 42' 13"	114° 55' 45"	

8	40	17	16	115	46	00	Crane's branch (of the south fork of Humboldt river.)
9	39	53	26	115	54	11	Head of south fork of Humboldt river.
11	39	47	01	116	33	39	Connor's spring.
14	39	11	57	117	14	12	Basil's creek.
16	38	49	21	117	16	52	Boiling springs.
17	38	33	17	117	24	29	Moore's creek.
21	38	23	11	118	24	51	Second's spring—Sheep mountain.
24	38	35	11	118	32	19	Eastern shore of lake Walker.
26	38	56	36	118	52	54	Walker river, three miles above its mouth in lake Walker.
29	39	09	05	119	05	23	Walker river, at its most northern bend.
Dec. 1	39	33	48	119	30	24	Salmon Trout river, above the lower canon.
2	39	30	51	119	51	52	Salmon Trout river.
3	39	22	09	120	02	50	Salmon Trout river, at the forks.
4	39	17	12	120	15	20	Pass in the Sierra Nevada, at head of Salmon Trout river.
6	39	11	06	120	44	24	On alluent to north fork of the <i>Rio de los Americanos</i> .
7	39	04	11	121	07	48	On Martin's fork (of Sacramento valley.)
8	38	53	05	121	08	49	On Hamilton's creek, (Sacramento valley.)
12	38	34	18	121	19	26	<i>Rio de los Americanos</i> , (opposite Grimes's house.)
18	37	29	56	120	14	11	Aux-un-ne river, (of the San Joaquin.)
20	37	07	47	119	23	32	On an alluent to the upper San Joaquin.
1846.							
Jan. 4	36	53	56	119	02	21	On the Tularé lake fork, (<i>Rio Reyes</i>), one mile below the junction of Taplin and Stepp's forks.
18	37	13	32	121	39	08	<i>The Laguna</i> , in the valley of <i>San Jose</i> , (of Francisco bay.)
Feb. 22	37	09	57	121	54	55	Road from <i>San Jose</i> to <i>Santa Cruz</i> , on the <i>Cuesta de los Gatos</i> .
23	37	08	45	121	52	40	Road from <i>San Jose</i> to <i>Santa Cruz</i> , near summit of the <i>Cuesta de los Gatos</i> .
Mar. 1	36	58	43	121	43	51	<i>Una Maroa</i> creek, (Bernardo Castro's,) bay of Monterey.
2	36	54	41	121	34	00	On the Pajaro river, (of the bay of Monterey,) one-fourth of a mile below <i>Asser's</i> house.
4	36	46	07	121	30	43	Gomez run, at edge of Salinas plain.
14	37	25	53	120	35	55	Towatunne river.
22	38	34	18	121	19	26	Rio de los Americanos, opposite Grimes's house.
26	39	07	45	121	30	21	Feather river, mouth of Yara river.
27	39	27	17	121	32	35	Bend of Feather river.
28	39	39	05	121	27	55	Butte creek, (Neal's rancho.)
29	39	52	58	121	52	58	Pine creek.
April 14	39	57	04	121	56	44	Deer river, (opposite Lassen's house,) half a mile above its mouth in the Sacramento.
25	40	23	58	122	03	27	Mouth of Nozah river, (of the Sacramento.)
26	40	38	58	121	57	24	Brant's creek.
27	40	50	33	121	47	18	Campbell's creek.
29	40	58	43	121	07	59	Upper Sacramento, above Fall river.
30	41	17	17	121	01	23	Upper Sacramento river, at upper end of Round valley.
May 1	41	48	49	121	15	24	Eastern shore of lake Rhett.

Date.	Latitude.	Longitude.	Locality.
1846.			
May	4	42 10 52	McCrady river.
	6	42 17 56	Denny's branch (of Tlamath lake.)
	7	42 33 13	Ambuscade creek, (of Tlamath lake.)
	11	42 36 35	Corral creek, (of Tlamath lake.)
	12	42 41 30	Torrey river, (of Tlamath lake.)
	14	42 21 23	We-to-wah creek, (southeastern end of Tlamath lake.)
	19	40 53 19	Russell's branch.
	20	40 39 52	Poinsett river, (of the upper Sacramento.)
	21	40 31 54	Myers's branch, (Sierra Nevada.)
	27	39 39 05	Butte creek.
	31	39 12 03	" Buttes of the Sacramento," (on a small run at southeastern base.)
June	7	39 14 41	" Buttes of the Sacramento," (on a small run or spring at northeastern base.)

Date.	Time.	Ther.	Locality.	Remarks.
1843.				
Dec. 17	Sunset.....	52.0	Lat. 42 57 22—on Summer lake.....	Fresh wind from SE. all day.
18	Sunrise.....	34.0	.....do.....do.....	Wind south; overcast.
18	Sunset.....	48.0	Lat. 42 42 37.....do.....	Rain during the night.
19	Sunrise.....	29.0	.....do.....do.....	Cloudy; a little rain.
19	Sunset.....	46.0	.....do.....do.....	
20	Sunrise.....	36.0	.....do.....do.....	
20	Sunset.....	39.0	.....do.....do.....	
21	Sunrise.....	33.0	.....do.....do.....	
21	Sunset.....	43.0	.....do.....do.....	
22	Daylight.....	39.0	.....do.....do.....	
23	Daylight.....	38.0	.....open, sandy plain.....	
23	Sunset.....	39.0	.....on side of a ridge.....	
24	Daylight.....	31.0	.....do.....do.....	
24	Sunset.....	37.0	Lat. 42 23 25—Christmas lake.....	Fair day; light breeze from south.
25	Daylight.....	32.0	.....do.....do.....	
25	Sunset.....	33.0	.....ponds south of Christmas lake.....	Wind south; fair.
26	Daylight.....	22.0	.....do.....do.....	Clouds rising around the horizon.
26	Sunset.....	30.0	Lat. 42 00 09—Boundary creek.....	Cloudy; light SE. wind.
27	Daylight.....	20.0	.....do.....do.....	Clear; wind SE.
27	Sunset.....	23.0	.....open, sage covered plain.....	Calm; sun faint.
28	Daylight.....	18.0	.....do.....do.....	Calm; reddish clouds over sky.
28	Sunset.....	34.0	.....hill side.....	Gentle southeast breeze—threatening snows.
29	Daylight.....	33.0	.....do.....do.....	Light snow falling.
29	Sunset.....	19.0	Lat. 41 27 50—aspens grove, on small stream among mountains.....	Thick snow greater part of day; evening and night clear; wind WSW.
30	Daylight.....	14.0	.....do.....do.....do.....	Fair; wind S. 80° W.
30	Sunset.....	19.0	.....in cañon of same stream.....	Fair.
31	Daylight.....	17.0	.....do.....do.....do.....	
31	Sunset.....	27.0	Lat. 41 19 55—on small stream, in open barren valley.....	Fair; moderate SW. wind.
1844.			.....do.....do.....do.....	Fair; light clouds in the east.
Jan. 1	Daylight.....	24.0	.....do.....do.....do.....	
1	Sunset.....	28.0	.....same stream.....do.....	

IV.—METEOROLOGICAL OBSERVATIONS—Continued.

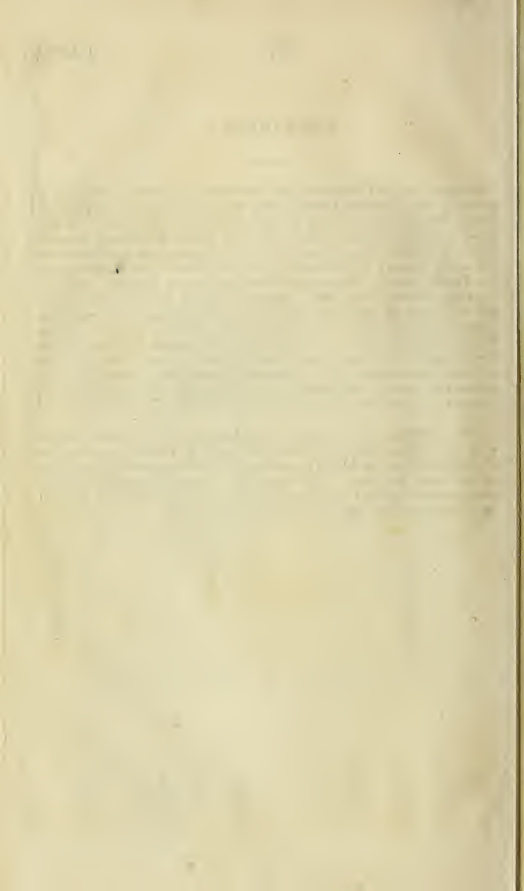
Date.	Time.	Ther.	Locality.	Remarks.
1844.				
31	Sunrise	25.0	Walker river, north fork	Cumuli in SE, and N.; snowing during greater part of the day.
Feb. 1	Sunrise	27.0	Lat. 38 37 18—Carson river	Overcast; snow falling.
1	Noon	40.0	do	Snowing all day.
1	Sunset	24.0	do	Clear and frosty.
2	Sunrise	24.0	do	
2	Sunset	35.0	branch of Carson river; summit parts of mountains	
3	Sunrise	14.0	do	Calm; clear; bright sunshine; elevation 6,760 feet.
3	3h. 45m. p. m. .	28.0	do	Nearly clear; calm.
3	Sunset	26.0	branch of Carson river	Nearly calm.
4	Sunrise	20.0	do	Overcast.
4	Sunset	40.0	do	Light white clouds in the east.
			Lat. 38 42 26—upper part of Sierra Nevada, branch of Carson river	
4	9h. p. m.	12.0	do	Elevation 7,400 feet.
5	Sunrise	10.9	do	Strong SW. wind.
5	Noon	48.0	do	Clear; moderate SW. wind.
5	Sunset	24.0	do	
6	Sunrise	16.0	do	Sky unclouded; light breeze SW.
6	Noon	37.0	do	Sky unclouded; calm.
6	Sunset	26.0	do	
7	Sunrise	9.5	do	Clear.
7	Sunset	28.0	do	Sky perfectly clear the whole day; light variable winds.
8	Sunrise	0.0	do	Sun shining full on the valley; cloudless; calm. When the rays of the sun fell on the high peaks, the thermometer was at 20.5.
			do	Light easterly breeze; nearly clear; elevation 7,920 feet.
8	3h. 40m. p. m. .	38.0	near the central ridge	Wind east; white clouds rising in horizon.
8	Sunset	36.0	do	Strong SW. wind; light sand driving rapidly.
9	Sunrise	29.0	do	Moderate WSW. wind; nearly clear; a few wind clouds in the west.
9	Noon	44.0	do	Wind variable; nearly clear; a few wind clouds in the west.
9	Sunset	24.0	do	Nearly calm; cloudy in SW.
10	Sunrise	35.0	do	Wind SE.; white clouds in W.; elevation 8,050 feet.
10	Noon	42.0	Lat. 38 41 57—immediately at foot of central ridge	Moderate SE. wind; sky partially overcast.
10	Sunset	37.0	do	

Date.	Time.	Thermometer.	Locality.	Remarks.
1844. Mar. 9	Sunset.....	62.0	Lat. 38 34 42—Now Helvetia, (Sacramento valley).....	Light grayish clouds in south; moderate SE. wind.
10	Sunrise.....	34.0	.....do.....do.....do.....	Light grayish clouds; sky clear; calm.
10	Sunset.....	63.0	.....do.....do.....do.....	Sky cloudy; wind SW.
11	Sunrise.....	45.0	.....do.....do.....do.....	Sky partially overcast; slight rain falling.
11	Sunset.....	56.0	.....do.....do.....do.....	Sky clear; no air stirring.
12	Sunrise.....	31.0	.....do.....do.....do.....	Sky unclouded; calm.
12	Sunset.....	63.0	.....do.....do.....do.....	Clear sky; fresh SW. wind.
13	Sunrise.....	35.0	.....do.....do.....do.....	No clouds; calm.
13	Noon.....	75.0	.....do.....do.....do.....	Strong westerly breeze.
13	Sunset.....	68.0	.....do.....do.....do.....	Light watery clouds in horizon; wind from NW.
14	Sunrise.....	45.0	.....do.....do.....do.....	Moderate wind, N. 10° W.; unclouded.
14	Sunset.....	76.0	.....do.....do.....do.....	Clear; perfectly calm.
15	Sunrise.....	44.0	.....do.....do.....do.....	Calm and cloudless.
15	Sunset.....	74.0	.....do.....do.....do.....	Reddish clouds around setting sun.
16	Sunrise.....	40.0	.....do.....do.....do.....	No wind; sky clear.
16	Noon.....	84.0	.....do.....do.....do.....	
16	Sunset.....	58.0	.....do.....do.....do.....	No air stirring; sky clear.
17	Sunrise.....	46.0	.....do.....do.....do.....	Sky clear; calm.
17	Sunset.....	63.0	.....do.....do.....do.....	Slight haze in north; calm.
18	Sunrise.....	38.0	.....do.....do.....do.....	Clear; calm.
18	Sunset.....	64.0	.....do.....do.....do.....	do.
19	Sunrise.....	41.0	.....do.....do.....do.....	Sky unclouded; no wind.
19	Sunset.....	68.0	.....do.....do.....do.....	Few scattering clouds in west.
20	Sunrise.....	40.0	.....do.....do.....do.....	Calm; unclouded.
20	Noon.....	81.0	.....do.....do.....do.....	Slight breeze N. 10° E.; white clouds in east.
20	Sunset.....	70.0	.....do.....do.....do.....	Clear sky; no wind.
21	Sunrise.....	41.0	.....do.....do.....do.....	Sky cloudy; calm.
21	Sunset.....	64.0	.....do.....do.....do.....	Dark clouds in east; wind N. 70° W.
22	Sunrise.....	36.0	.....do.....do.....do.....	Scattered wind clouds; wind west.

POSTSCRIPT.

Mineral salt.—The mineral or rock salt, of which a specimen is placed in the Congress Library, was found in the place marked by Baron Humboldt in his map of New Spain, (northern half,) as derived from the journal of the missionary *Father Escalante*, who attempted, towards the close of the last century, to penetrate the unknown country from Santa Fé, of New Mexico, to Monterey, of the Pacific ocean. The adventurous missionary does not seem to have got farther, and that was a great deal at that time, than the south end of the Utah lake, called Lake Timpanogos—a term signifying Rock river. Southeast of that lake is the chain of the Wah-satch mountains, constituting in that place the rim of the Great Basin. In this mountain, at the place where Humboldt has written "*Montagnes de Sel Gemme*," (Rock Salt mountain,) this mineral is found. Its locality, the head waters of a small creek, tributary to the Utah lake, on its southeast, in thick strata of red clay.

The crystallized salt, formed from the spray of the lake on whatever it touches—plants, shrubs, &c.—and of which a specimen is also in the Congress Library, was taken from the southeastern shore of the Great Salt lake. That specimen shows a formation of more than an inch thick of pure crystallized salt on the stem of a small twig, less than the size of a common goose quill.







Explorations
P.R. 1842 or what means Fremont's Explorations made in 1842 to the
The Arabic figures note the elevation of the country above the level
of the sea.
S before a feminine name signifies Santa, as Santa Barbara.
S before a masculine name signifies San, as San Luis Rey (St. Louis the King).
T before masculine names (on the coast) signifies Punta, or Point
according to the gender of the name, as Punta Gorda, (Big Point) or
Punta Concepcion (Point Concepcion).
I before the names of islands stands for Isla (island), as Isla de Santa
Catalina or Isla de San Clemente, Santa, or San according to the gender.

**MAP OF
OREGON AND UPPER CALIFORNIA**
From the Surveys of
JOHN CHARLES FREMONT
And other Authorities
DRAWN BY CHARLES PREUSS
Under the Order of the
SENATE OF THE UNITED STATES
Washington City 1848.
Scale 1:3,000,000

Lith. by E. Weber & Co. Ballo



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